

# Chapter Three

## AFFECTED ENVIRONMENT

The purpose of this chapter is to describe the character of the existing environment in which the Proposed Action would occur. Because neither the No-Action nor the Proposed Action Alternatives involve land disturbances, the potential for environmental consequences is limited. Therefore, the discussion of the affected environment is limited to a description of only those environmental resources which have the potential to be affected. Environmental resource categories that have the potential to be affected by the Proposed Action are discussed in Section 3.2, while Section 3.3 summarizes the environmental impact categories that will not be affected.

### 3.1 ENVIRONMENTAL STUDY AREA

This section provides general information on the MASE Airspace Redesign Environmental Study Area, airport facilities, airspace, and typical meteorological patterns (i.e., weather and climate).

#### 3.1.1 Setting and Location

The Environmental Study Area encompasses a portion of the Great Lakes region of the United States, as illustrated in **Figure 3-1**. The Environmental Study Area consists of a 50 nautical mile radii around both DTW and CLE, with tangential connections to encompass the area between these two primary airports.

The Environmental Study Area encompasses approximately 16,100 square nautical miles (or 21,300 statute square miles) of land and water, and includes portions of the states of Michigan and Ohio in the United States and the province of Ontario in Canada. The counties included in the Environmental Study Area are listed in **Table 3-1**.

CLE and DTW are located at elevations of 792 and 646 feet, respectively. The altitude ceiling for environmental considerations regarding airspace studies is 10,000 feet AGL.<sup>1</sup>

**Table 3-1**

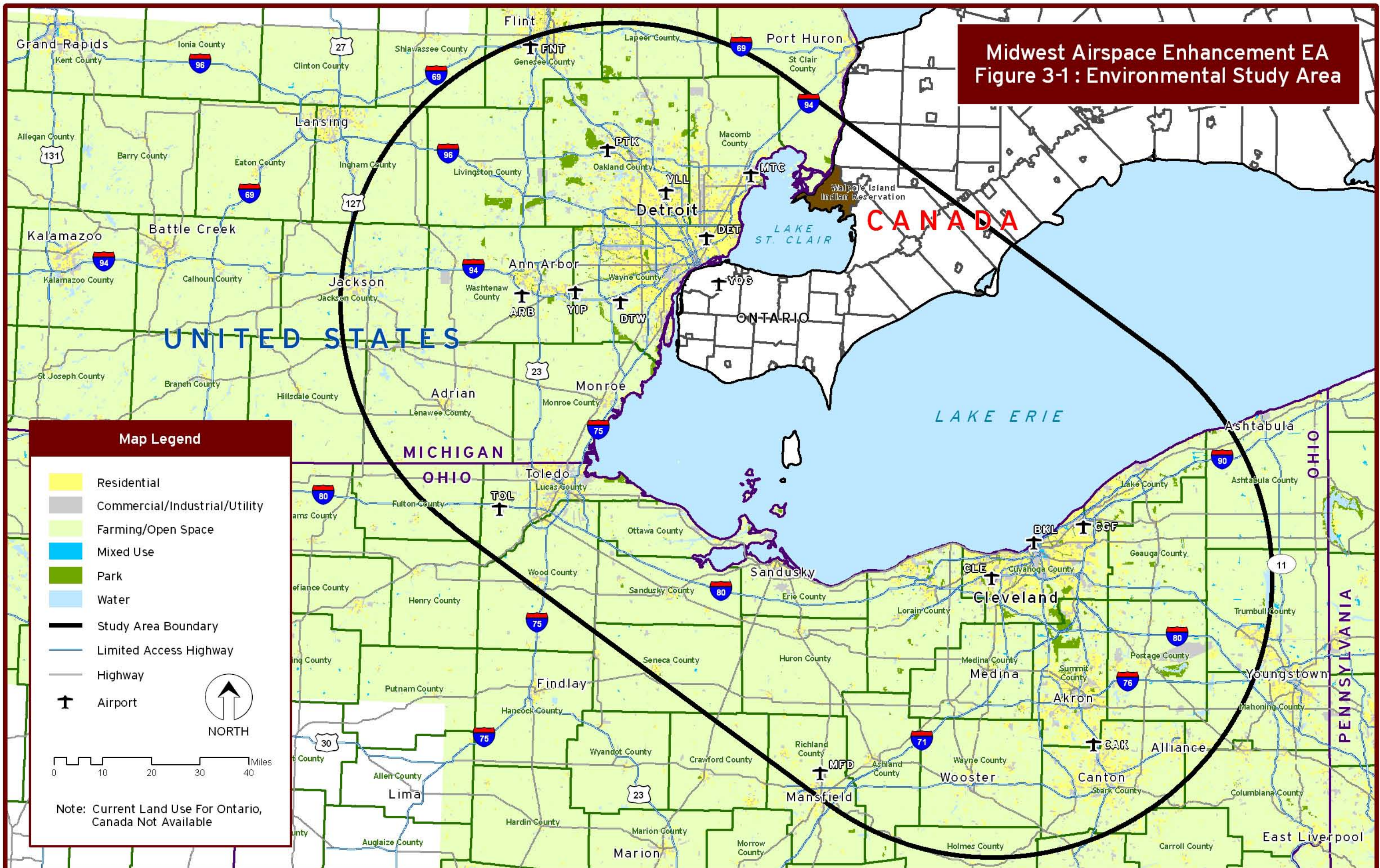
**Counties Located in the Environmental Study Area**

Michigan		Ohio		
Genesee	Macomb	Ashland	Huron	Sandusky
Hillsdale	Monroe	Ashtabula	Lake	Seneca
Ingham	Oakland	Columbiana	Lorain	Stark
Jackson	St. Clair	Crawford	Lucas	Summit
Lapeer	Shiawassee	Cuyahoga	Mahoning	Trumbull
Lenawee	Washtenaw	Erie	Medina	Tuscarawas
Livingston	Wayne	Fulton	Ottawa	Wayne
		Geauga	Portage	Wood
		Holmes	Richland	

Source: HNTB Corporation



Midwest Airspace Enhancement EA  
Figure 3-1 : Environmental Study Area





The highest point in the Environmental Study Area, at an elevation of 1,446 feet MSL, is Round Knob located in Columbiana County, Ohio.<sup>2</sup> Thus, using a conservative estimate of the maximum ground elevation of up to 2,000 feet MSL within the Environmental Study Area, the potential environmental impacts associated with alternative routings will be evaluated for aircraft flying IFR up to an altitude of 12,000 feet MSL.

### 3.1.2 Airport Facilities

There are numerous public and private airports located in the Environmental Study Area; however, this EA focuses on the two primary airports, CLE and DTW, as well as thirteen secondary airports which have an average of 10 or more daily IFR operations (based on sampled radar data<sup>3</sup>) and thus could be affected by the proposed airspace redesign. **Figure 3-1** illustrates the airports in the Environmental Study Area.

#### 3.1.2.1 Primary Airports

CLE is located in Cuyahoga County, Ohio, about six miles from the Lake Erie shoreline and 13 miles southwest of downtown Cleveland. CLE has 82 aircraft gates. The City of Cleveland owns and operates the airport under the management of the Department of Port Control. In 2004, approximately 263,561 aircraft operations were conducted at CLE. Twenty-two major scheduled airlines operate out of CLE.<sup>4</sup> **Figure 3-2** depicts the airport.

DTW is located in Wayne County, Michigan and is operated by the Wayne County Airport Authority. DTW has 139 aircraft gates. In 2004, approximately 563,198 aircraft operations were conducted at DTW. Eighteen major scheduled carriers serve DTW.<sup>5</sup> **Figure 3-3** depicts the airport.

#### 3.1.2.2 Secondary Airports

The thirteen airports in the Environmental Study Area that typically have 10 or more daily IFR flights are depicted in **Table 3-2**. Although not a civil airport with frequent IFR operations, Selfridge Air National Guard base is included due to its mix of military jet and turboprop aircraft and the potential noise exposure that results from these operations.

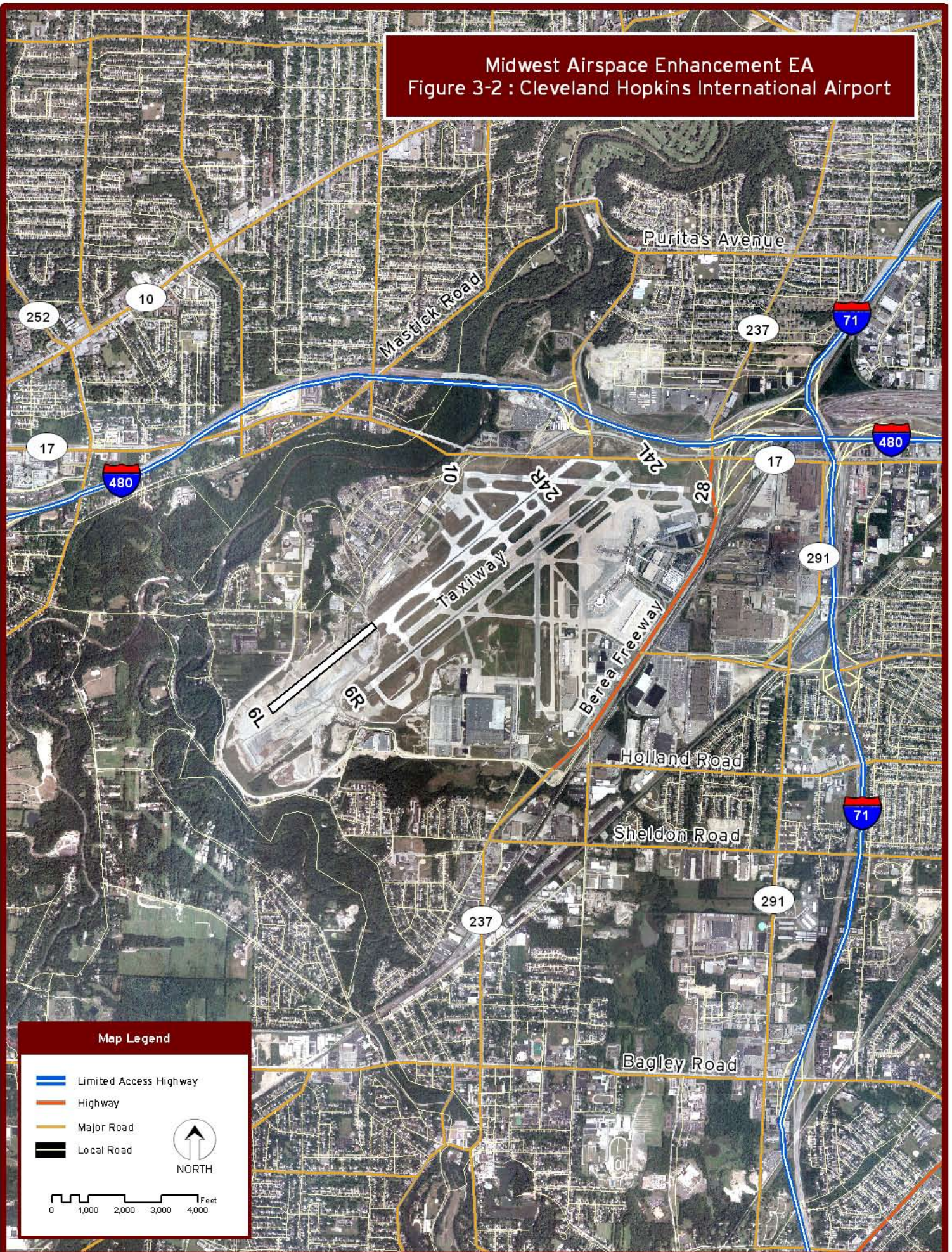
### 3.1.3 Airspace

The existing airspace structure, which is also the No Action Alternative, uses a system of navigational fixes, routes, and procedures to route aircraft through the Environmental Study Area. Section 1.2.1 provides information on the ATC facilities in the Environmental Study Area which serve to manage and provide separation to aircraft operating under instrument flight rules (IFR). In addition, **Appendix B** provides an overview of the National Airspace System and the procedures used to direct and manage aircraft during the takeoff, cruise, and landing phases of flight. **Appendix B** also provides information on the airspace classifications (i.e., Class B, C, D, and E) which are designed primarily to manage visual flight rules (VFR) traffic in controlled airspace in order to ensure separation from IFR aircraft. The intent of this section is to discuss the general flow of air traffic in the Environmental Study Area, in regard to the effect of aircraft routings on the affected environment (e.g., noise).

Generally, most air carrier and general aviation jet aircraft flying within the Environmental Study Area are in the takeoff or landing phase of flight from a commercial service airport. During the cruise phase of flight, these aircraft are usually flying above 18,000-feet MSL and as such are above the Environmental Study Area. Non-jet general



Midwest Airspace Enhancement EA  
Figure 3-2 : Cleveland Hopkins International Airport





Midwest Airspace Enhancement EA  
Figure 3-3 : Detroit Metropolitan Wayne County Airport

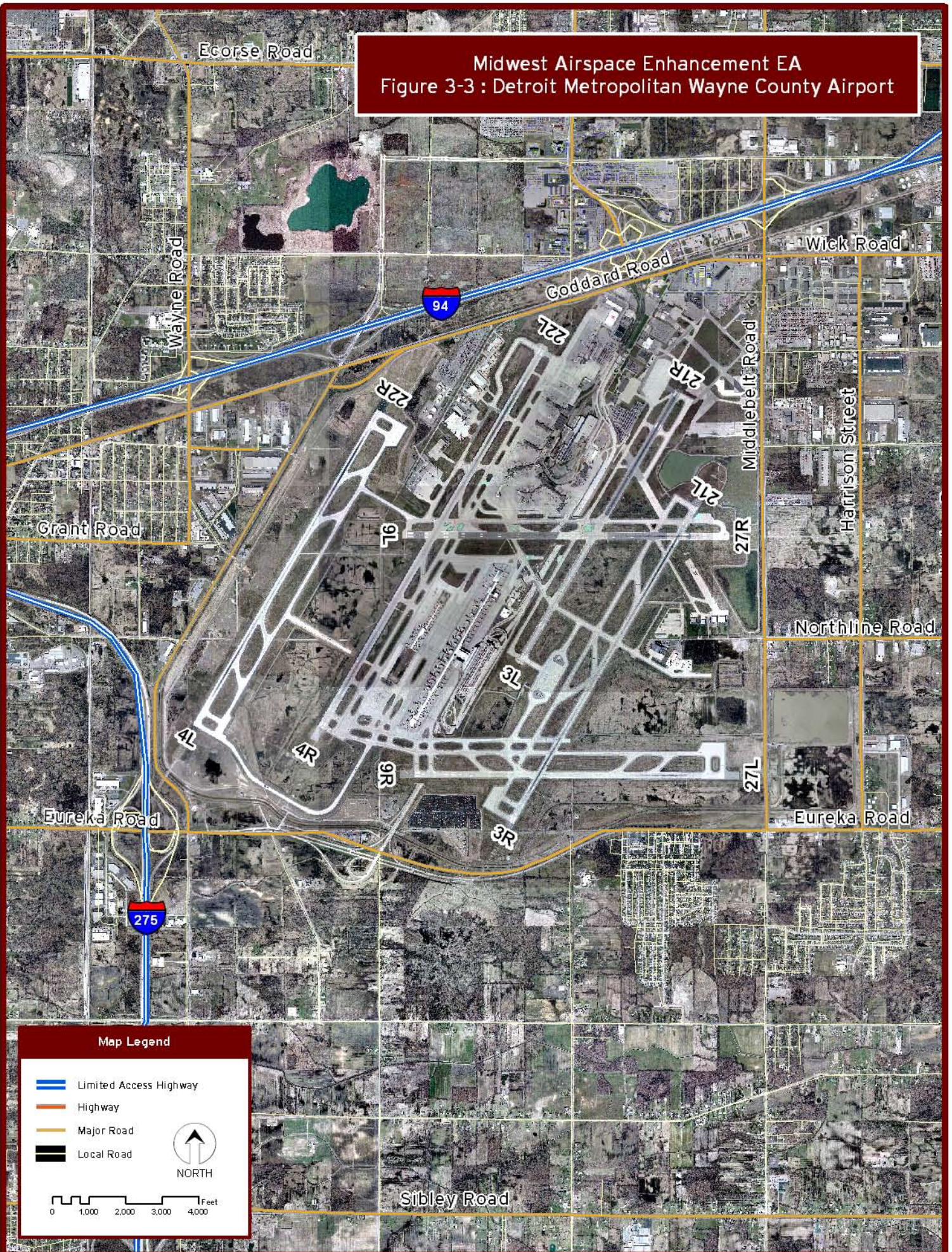




Table 3-2

## Secondary Airports in Study Area

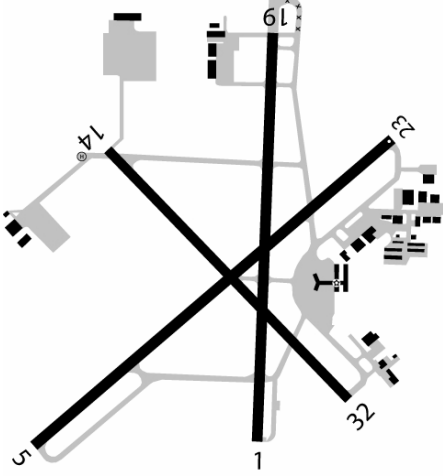
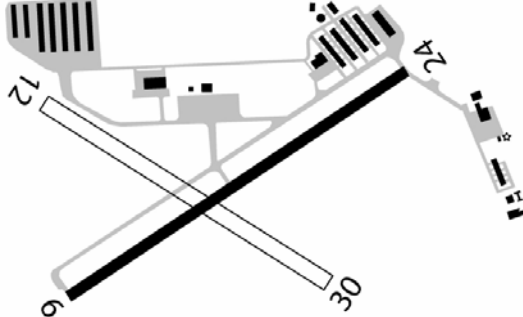
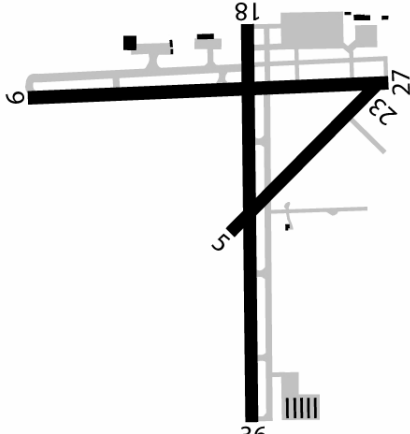
Airport (Identifier) and Diagram <sup>(1)</sup>	Description	
<p data-bbox="203 352 537 380">Akron/Canton Regional (CAK)</p> 	Location	Northeastern Ohio between Summit and Stark Counties; 10 miles southeast of Akron.
	Owner/Operator	Bi-county airport authority
	Based Aircraft (total)	155
	Single-engine	80
	Multi-engine	30
	Jets	22
	Military	22
	Helicopter	1
	2004 Annual Ops	126,801
	Runway Lengths	5/23: 7,597' 1/19: 7,000' 14/32: 5,599'
<p data-bbox="203 884 516 911">Ann Arbor Municipal (ARB)</p> 	Location	Washtenaw County, Michigan; 3 miles south of the City of Ann Arbor.
	Owner/Operator	City of Ann Arbor
	Based Aircraft	178
	Single-engine	138
	Multi-engine	27
	Helicopters	11
	Ultralights	2
	2004 Annual Ops	80,930
	Runway Lengths	6-24: 3,500' 12-30: 2,750'
<p data-bbox="203 1241 500 1268">Bishop International (FNT)</p> 	Location	Flint, Michigan, in Genesee County.
	Owner/Operator	Bishop International Airport Authority
	Based Aircraft	157
	Single-engine	140
	Multi-engine	10
	Jet	7
	2004 Annual Ops	127,810
	Runway Lengths	18-36: 7,484' 9-27: 7,199' 5-23: 4,291'



Table 3-2

## Secondary Airports in Study Area

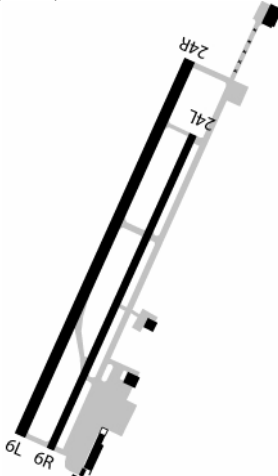
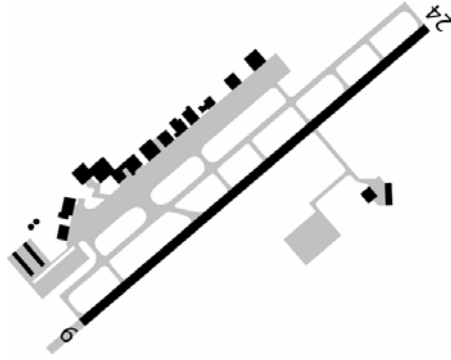
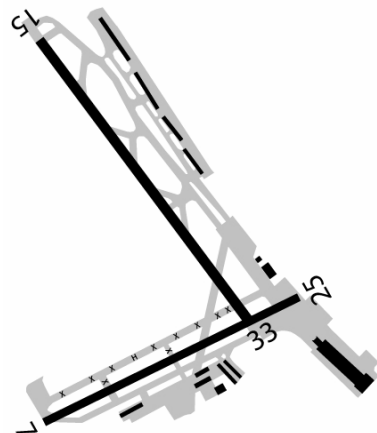
Airport (Identifier) and Diagram <sup>(1)</sup>	Description	
Burke Lakefront (BKL) 	Location	Cuyahoga County, one mile north of Cleveland.
	Owner/Operator	City of Cleveland Department of Port Control
	Based Aircraft	79
	Single-engine	50
	Multi-engine	12
	Jet	5
	Helicopters	12
	2004 Annual Ops	96,658
Cuyahoga County (CGF) 	Location	Cleveland, Ohio, in Cuyahoga County.
	Based Aircraft	206
	Single-engine	96
	Multi-engine	18
	Jets	91
	Helicopter	1
	2004 Annual Ops	62,948
Detroit City (DET) 	Location	Wayne County, Michigan, 5 miles northeast of Detroit.
	Based Aircraft	175
	Single-engine	136
	Multi-engine	21
	Jets	12
	Helicopter	6
	2004 Annual Ops	75,942
	Runway Lengths	7-25: 4,025' 15-33: 5,090'



Table 3-2

## Secondary Airports in Study Area

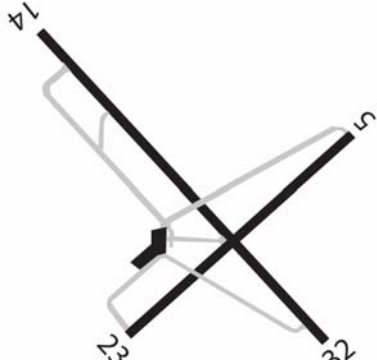
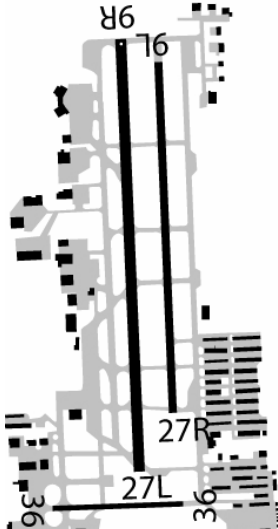

Airport (Identifier) and Diagram <sup>(1)</sup>	Description	
<p>Mansfield Lahm Regional (MFD)</p> 	Location	Richfield County, Ohio.
	Owner/Operator	City of Mansfield
	Based Aircraft	80
	Single-engine	62
	Multi-engine	7
	Jets	3
	Military	8
	2004 Annual Ops	40,574
	Runway Lengths	5-23: 6,795' 14-32: 9,001'
<p>Oakland County (PTK)</p> 	Location	Oakland County, Michigan.
	Owner	County of Oakland
	Based Aircraft (total)	798
	Single-engine	537
	Multi-engine	139
	Jets	117
	Helicopter	5
	2004 Annual Ops	281,797
	Runway Lengths	9L-27R: 5,000' 9R-27L: 6,200' 18-36: 1,856'
<p>Oakland/Troy (VLL)</p> 	Location	Oakland County, Michigan.
	Owner	County of Oakland
	Based Aircraft	146
	Single-engine	126
	Multi-engine	10
	Jets	1
	Helicopter	3
	Ultralights	3
	2004 Annual Ops	56,419
Runway Length		3,550'



Table 3-2

## Secondary Airports in Study Area

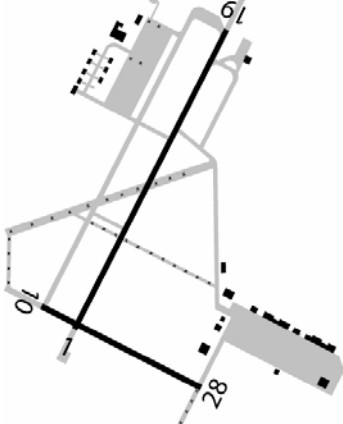
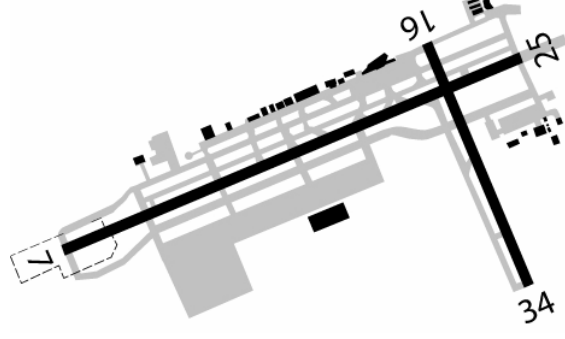
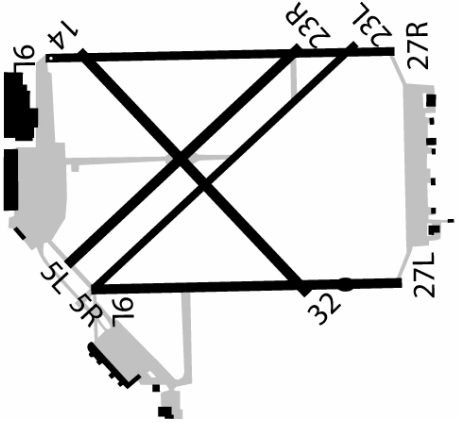
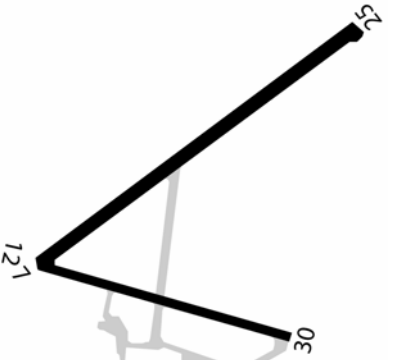
Airport (Identifier) and Diagram <sup>(1)</sup>	Description	
Selfridge Air National Guard (MTC) 	Location	Macomb County, Michigan.
	Owner/Operator	US Air Force
	Based Aircraft	1
	Military	1
	2004 Annual Ops	37,200
	Runway Length	1-19: 9,000'
Toledo Express (TOL) 	Location	Ten miles west of Toledo, Ohio in Lucas County.
	Owner	Toledo-Lucas County Port Authority
	Based Aircraft	97
	Single-engine	24
	Multi-engine	26
	Jets	30
	Military	17
	2004 Annual Ops	98,523
	Runway Lengths	7-25: 10,600' 16-34: 5,599'



Table 3-2

## Secondary Airports in Study Area

Airport (Identifier) and Diagram <sup>(1)</sup>	Description	
	Location	Wayne and Washtenaw Counties, Michigan.
	Owner/Operator	Wayne County Airport Authority
	Based Aircraft	378
	Single-engine	144
	Multi-engine	88
	Jets	139
	Helicopter	8
	2004 Annual Ops	114,140
	Runway Lengths	5L-23R: 6,655' 5R-23L: 7,526' 9L-27R: 7,294' 9R-27L: 6,511' 14-32: 6,194'
	Location	Windsor, Ontario, 8 miles from Detroit.
	Owner/Operator	City of Windsor/Serco Aviation Services, Inc.
	2004 Annual Ops	32,756
	Runway Lengths <sup>(2)</sup>	7-25: 9,000' 12-30: 5,150'

Note: Airport diagrams not to same scale.

## Sources:

(1) Airport diagrams are from the US Government Flight Information Publication Airport/Facility Directory.

YQG diagram derived from [www.windsorairport.net](http://www.windsorairport.net).

(2) From [www.statcan.ca](http://www.statcan.ca), February 2, 2005.

Annual operations are estimates from the FAA TAF. All other information is from [www.fltplan.com](http://www.fltplan.com), February 1, 2005.



aviation aircraft typically operate at lower altitudes, and are more apt to be in the cruise portion of flight within the Environmental Study Area.

To help understand the limitations in the existing airspace structure, consider the flows of air traffic in the Environmental Study Area. Fixed-wing aircraft must generally depart (takeoff) and arrive (land) into the wind, in order to increase aircraft performance (i.e., reduced takeoff and landing distance and increased climb rate) and maintain safety. While runway use is generally determined by wind, other factors also play a role. For example, weather conditions such as low visibility and/or cloud ceiling can also affect runway selection, as some runways have enhanced Instrument Meteorological Conditions (IMC) capabilities and the availability of instrument approach procedures (e.g., Instrument Landing Systems, ILS). In the absence of wind and weather factors, operational necessity and traffic demand can determine runway selection as some runway flows have a higher operational capacity than others, due in part to runway layout. A runway use configuration is the combination and orientation of runways that aircraft use at a particular time in response to these factors.

Several airspace configurations are possible, based on the interaction of runways in use at each airport. Runway use and resulting arrival and departure routes from one airport may affect the arrival and departure routes at another airport. As a result, there are multiple airport/runway use interdependencies through the interaction of aircraft routes from different airports. DTW operates primarily in a north or south configuration: north on Runways 03L, 03R, 04L, and 04R and south on Runways 21L, 21R, 22L, and 22R. CLE operates similarly, with the primary configurations being a

north or south runway flow: northeast on Runways 06L and 06R and south on Runways 24L and 24R.

**Figures 3-4 and 3-5** show a sample of the arrival and departure routes used in the existing airspace structure for the north and south flows, respectively. As previously stated, air traffic routes vary depending on the runway configuration in use at each airport. Departing aircraft are assigned to a departure runway that is based on the particular flow (e.g., north or south) in which the primary airport is operating, and the flight's destination which generally determines the initial departure fix to be navigated towards once airborne and all applicable in-close noise abatement procedures have been satisfied. Arriving aircraft are assigned to a route based upon the expected arrival runway, and the flight's origin and direction of approach to the destination airport. ATC operates in a systematic manner, such that flights between two airports (e.g., CLE and New York) will typically be assigned to the same route. This ensures that ATC operates in a safe and efficient manner and results in the establishment of the primary air traffic routes.

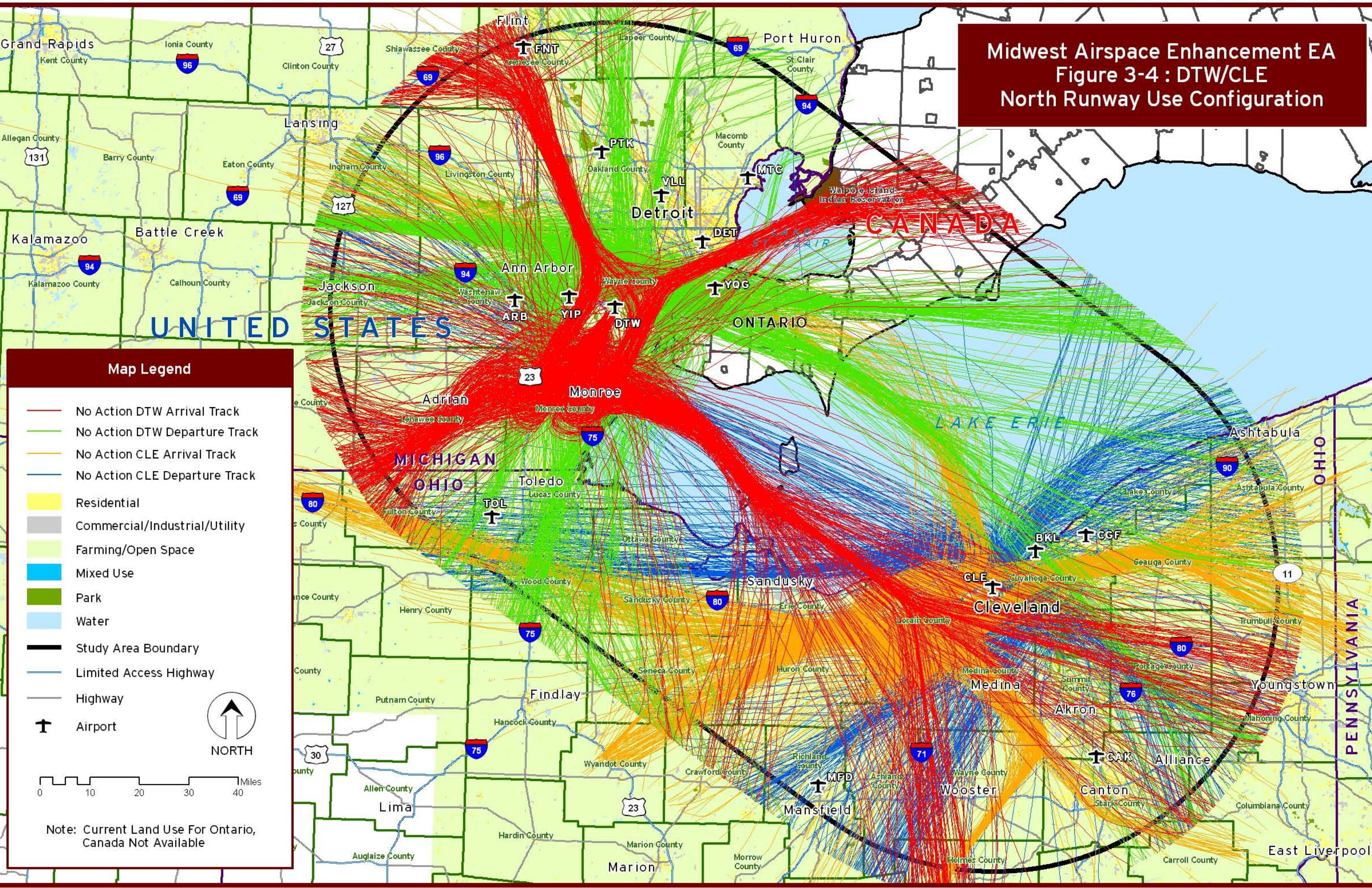
**Figures 3-4 and 3-5** also depict the complexity of the current airspace structure and the interoperability of the airports with regard to aircraft routing. Although the existing airspace structure provides for the safe travel of aircraft, there are inherent limitations in its design which result in considerable inefficiencies.

### 3.1.4 Weather and Climate

Weather and climate are important factors in aviation operations. Wind, temperature, precipitation, and storms affect how aircraft operate and how air traffic is managed. While the Environmental Study Area



Midwest Airspace Enhancement EA  
Figure 3-4 : DTW/CLE  
North Runway Use Configuration



**Map Legend**

- No Action DTW Arrival Track
- No Action DTW Departure Track
- No Action CLE Arrival Track
- No Action CLE Departure Track
- Residential
- Commercial/Industrial/Utility
- Farming/Open Space
- Mixed Use
- Park
- Water
- Study Area Boundary
- Limited Access Highway
- Highway
- Airport

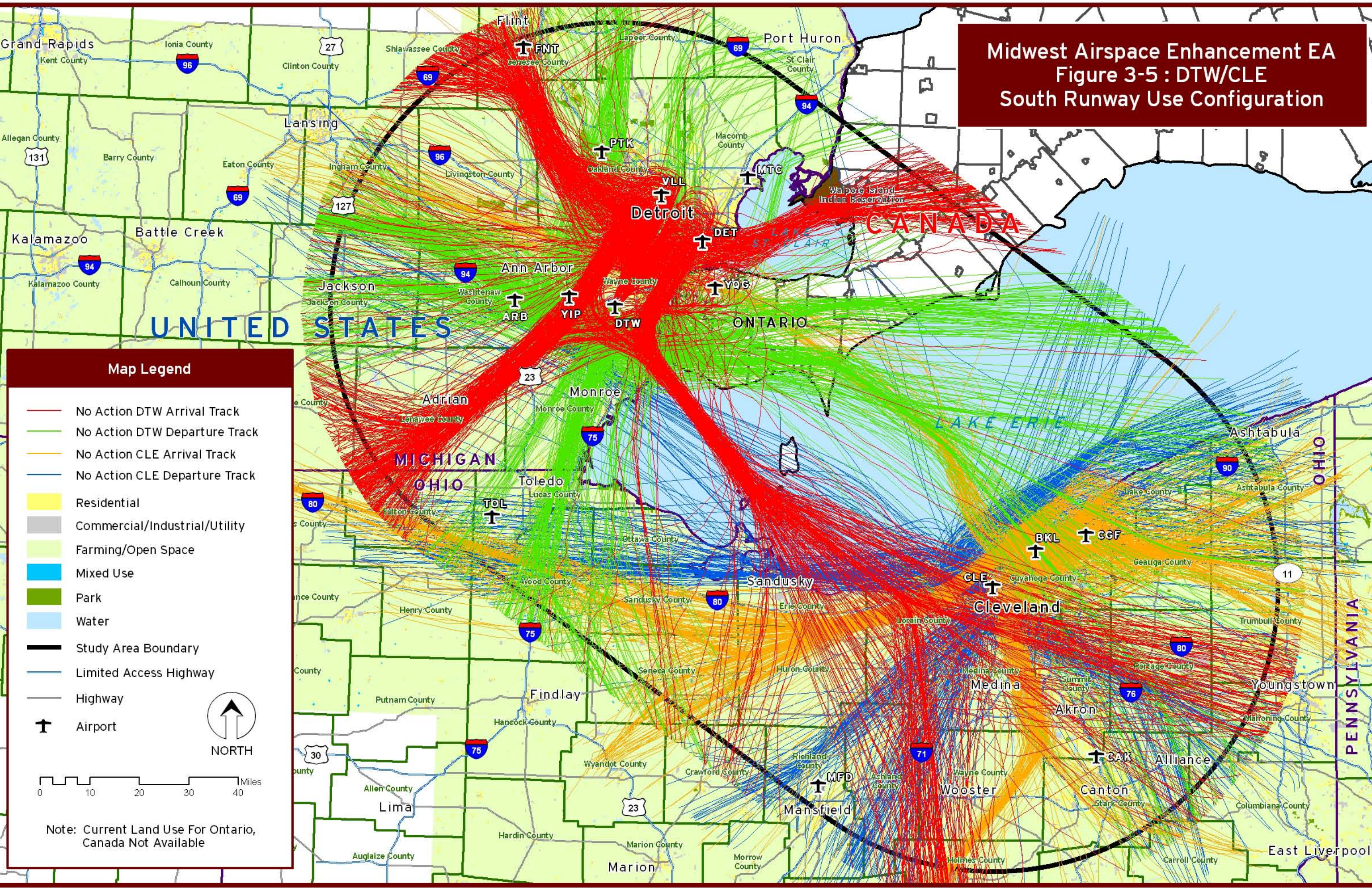
NORTH

0 10 20 30 40 Miles

Note: Current Land Use For Ontario, Canada Not Available



Midwest Airspace Enhancement EA  
Figure 3-5 : DTW/CLE  
South Runway Use Configuration



Map Legend

- No Action DTW Arrival Track
- No Action DTW Departure Track
- No Action CLE Arrival Track
- No Action CLE Departure Track
- Residential
- Commercial/Industrial/Utility
- Farming/Open Space
- Mixed Use
- Park
- Water
- Study Area Boundary
- Limited Access Highway
- Highway
- Airport



0 10 20 30 40 Miles

Note: Current Land Use For Ontario, Canada Not Available



usually experiences four well defined seasons, the climate is significantly influenced by Lake Erie and is often characterized by rapidly changing weather.

Aircraft generally takeoff and land into the wind (known as a headwind) whenever possible. Headwinds reduce an aircraft's takeoff and landing distance, and increase climb rate. Aircraft can operate with considerable crosswinds (a wind blowing at the side of the aircraft), up to about 20 knots for a typical air carrier aircraft. Aircraft can operate with limited tailwinds (a wind blowing on the rear of the aircraft), up to 10 knots for a typical air carrier aircraft. Tailwinds increase takeoff and landing distance. Winds in excess of crosswind and tailwind limits force aircraft to use a different runway. Accordingly, wind speed and direction dictate the orientation of runways at an airport and the use of specific runway configurations. The general atmospheric flow in the Environmental Study Area is from west to east and winds are generally from the south and west. The average wind speed at DTW is 10.3 mph and at CLE is 10.5 mph.<sup>6</sup> On average, the winter months are windier than the summer months. Strong winds are also frequently associated with severe thunderstorms.

Temperature is an important factor in aircraft performance. High temperatures decrease the density of air, which increases aircraft takeoff distance and reduces climb performance. This generally results in increased noise exposure during hot temperatures, as compared to colder temperatures. Temperatures at both DTW and CLE are somewhat moderated by Lake Erie. The average temperature for both airports is about 50-degrees Fahrenheit.<sup>7</sup>

In general, precipitation is associated with storm events and reduced visibility. These factors can result in increased airport delays.

Snowfall and precipitation amounts depend greatly upon location within the Environmental Study Area relative to Lake Erie. On average, 43.5 inches of snow and 32.9 inches of liquid precipitation fall each year at DTW. At CLE, on the lee side of Lake Erie, 63.3 inches of snow and 38.7 inches of liquid precipitation fall annually.<sup>8</sup> The substantial precipitation amount is due to the "lake effect." Cold arctic air moves over the lake which is relatively warmer since it retains heat from the summer months. The cold air is warmed and picks up moisture. When the cold air mass moves over land again, the moisture condenses as the air is cooled and falls as snow or other precipitation.

Severe weather, such as thunderstorms, can result in increased aircraft delay. Severe weather is most common in the summer months. According to National Oceanic and Atmospheric Administration (NOAA), Detroit has an average of 33 thunderstorms each year. Cleveland averages 34 thunderstorms per year.<sup>9</sup> In order to mitigate disruption to air traffic that frequently occurs with severe weather and thunder storms, the FAA has developed Severe Weather Avoidance Plans (SWAP).

According to FAA Order 7210.3, Facility Operation and Administration, "SWAPs are formalized programs that are of considerable value in areas that are particularly susceptible to severe weather. Plans that are properly developed, coordinated and implemented can reduce coordination and traffic management initiatives associated with rerouting aircraft around areas of severe weather; therefore, resulting in better utilization of available airspace." The National Playbook is a collection of SWAP routes. Centers use these routes to mitigate the potential impacts to the national airspace system in the event of severe weather.



## 3.2 POTENTIALLY AFFECTED ENVIRONMENTAL RESOURCE CATEGORIES

As discussed in Chapters One and Two, the Proposed Action consists of alternative flight track routings for aircraft in the Environmental Study Area. Accordingly, the primary environmental impact category of concern is noise. Noise could adversely affect residential areas and other noise sensitive land uses such as schools, places of worship, hospitals, parks, and cultural resources (e.g., historic sites). Also, changes in noise exposure levels could disproportionately affect minority or low income populations. As a result, noise and land use are discussed in this section.

Existing air quality and wildlife are also discussed in this section. Although air quality would not likely be impacted by the Proposed Action, air pollution from aviation sources is a public concern. Wildlife, specifically endangered species and migratory birds, are discussed due to the potential impacts of alternative aircraft routes.

### 3.2.1 Noise

Aircraft noise is often the most noticeable environmental effect associated with aviation. This section includes a brief overview of the noise analysis methodology used for this EA as well as a discussion of the existing aircraft noise exposure levels in the Environmental Study Area.

#### 3.2.1.1 Noise Modeling Methodology

The FAA has developed specific guidance and requirements for the assessment of aircraft noise in order to comply with NEPA. This guidance, specified in FAA Order 1050.1E, requires that aircraft noise be analyzed in terms of the yearly Day-

Night Average Sound Level (DNL) metric. To this end, DNL noise levels are calculated for the average annual daily operations for the years of interest. For this study, noise modeling was conducted for 2004 as described in this chapter; forecast conditions in 2006 and 2011 for the No Action and Proposed Action Alternatives are described in Chapter Four, Environmental Consequences.

The DNL metric is the sound level from aircraft operations for a 24 hour period, which includes all of the time-varying aircraft sound energy within the period. Since there is a greater annoyance caused by noise events at night, a 10 dB weighting is added to the DNL for nighttime noise events. The weighting, in essence, equates one nighttime flight to ten daytime flights. Nighttime noise events are those that occur between 10:00 P.M. and 6:59 A.M. This extra nighttime event weighting helps to account for the annoyance of noise during time periods when people are trying to sleep and ambient noise levels are lower. Additional details relating to the physics of sound, the effect of noise on people, and the DNL metric is available in **Appendix H**.

The MASE project covers a widespread area and involves high-altitude route changes. The noise analysis is conducted for the entire Environmental Study Area up to an altitude of 10,000 AGL, as discussed in Section 3.1. Specifically, aircraft operations at CLE, DTW, and the airports shown in **Table 3-2** are included in the noise analysis.

The Noise Integrated Routing System (NIRS) model is used to calculate aircraft noise exposure for airspace projects, including MASE. NIRS was developed by the FAA specifically to assess noise effects associated with regional airspace projects.

Detailed information on aircraft operations within the Environmental Study Area is assembled for input into NIRS. This includes specific fleet mix information such as aircraft type, arrival and departure times, and origin/destination airport. The operational forecasting used in the noise modeling is discussed in Section 1.2.4 and **Appendix D**.

While the fleet mix defines the number and type of aircraft operations, runway use and flight track location/usage provide information on where and how aircraft travel in the Environmental Study Area. Modeled flight tracks were developed from an 80-day sample of radar data, which included over 500,000 actual flight tracks. The radar data sample provided information on flight route geometry, aircraft usage by type and time of day, and flight profiles (i.e., altitudes).

Environmental conditions (e.g., temperature and humidity) that affect the propagation of noise through the air and terrain data are also incorporated into the NIRS modeling. Additional details on NIRS and development of the noise modeling are available in **Appendix I**.

Noise exposure from aircraft operations was calculated at more than 300,000 locations throughout the approximate 16,100 square nautical mile Environmental Study Area. The locations consist of (1) population centroids (i.e., center of census block); (2) noise sensitive locations such as schools, places of worship, and parks; and (3) evenly spaced grids over the entire Environmental Study Area.

Census blocks are the smallest geographic unit for which the U.S. Census Bureau tabulates data. Census blocks are generally bounded by streets, legal boundaries, and other features. The number of people exposed to noise is estimated as the number

residing in the census block. For this analysis, the census block counts represent the maximum potential population within the census block that could be exposed to the modeled DNL levels. The actual number of people impacted can be less than the total population represented by a single census block because noise levels will vary throughout the census block. A total number of 173,242 census blocks in the Environmental Study Area were analyzed. For more information regarding the population forecasting, refer to **Appendix E**.

### 3.2.1.2 Existing Aircraft Noise Exposure

**Figure 3-6** shows the existing (2004) noise exposure levels for the entire Environmental Study Area. The color of each population centroid is thematically based as defined in **Table 3-3**. In general, the majority of the Environmental Study Area is exposed to aircraft noise levels less than 45 DNL. As would be expected, the areas closer to the airports are exposed to the highest noise exposure levels. As shown in **Table 3-4**, the majority (i.e., 82.28%) of people residing within the Environmental Study Area are exposed to less than 45 DNL. Approximately 17,092 people (i.e., 0.17%) experience noise exposure levels of 65 DNL or more.

The 2004 existing condition noise analysis is intended to provide a frame of reference when considering the future condition noise analyses presented in Chapter Four, Environmental Consequences. The purpose is to provide readers of this EA with the opportunity to equate current personal experience with the calculated noise metrics, as well as the degree of exposure. In addition, the 2004 noise analysis is the foundation upon which the noise modeling for the future conditions (i.e., 2006 and 2011) is developed.



**Table 3-3**  
**Color Coding for DNL Ranges**

<b>DNL Range (dB)</b>	<b>Color</b>
Less than 45	Magenta
45 to less than 50	Dark Blue
50 to less than 55	Light Blue
55 to less than 60	Green
60 to less than 65	Yellow
65 to less than 70	Orange
70 to less than 75	Red

Source: NIRS

**Table 3-4**  
**2004 Maximum Population Exposed to Aircraft Noise**

<b>DNL Range (dB)</b>	<b>Population</b>	<b>Percentage of Total</b>
Less than 45	8,372,839	82.28%
45 to less than 50	1,152,313	11.32%
50 to less than 55	437,643	4.30%
55 to less than 60	149,017	1.46%
60 to less than 65	46,211	0.45%
65 to less than 70	13,879	0.14%
70 to less than 75	2,757	0.03%
Greater than or equal to 75	456	< 0.01%
Total	10,175,115	100.00%

Sources: Metron Inc./HMMH Analysis, 2005

### 3.2.2 Land Use and Demographics

Land use located within the Environmental Study Area is described in this section, as well as Native American lands and demographics.

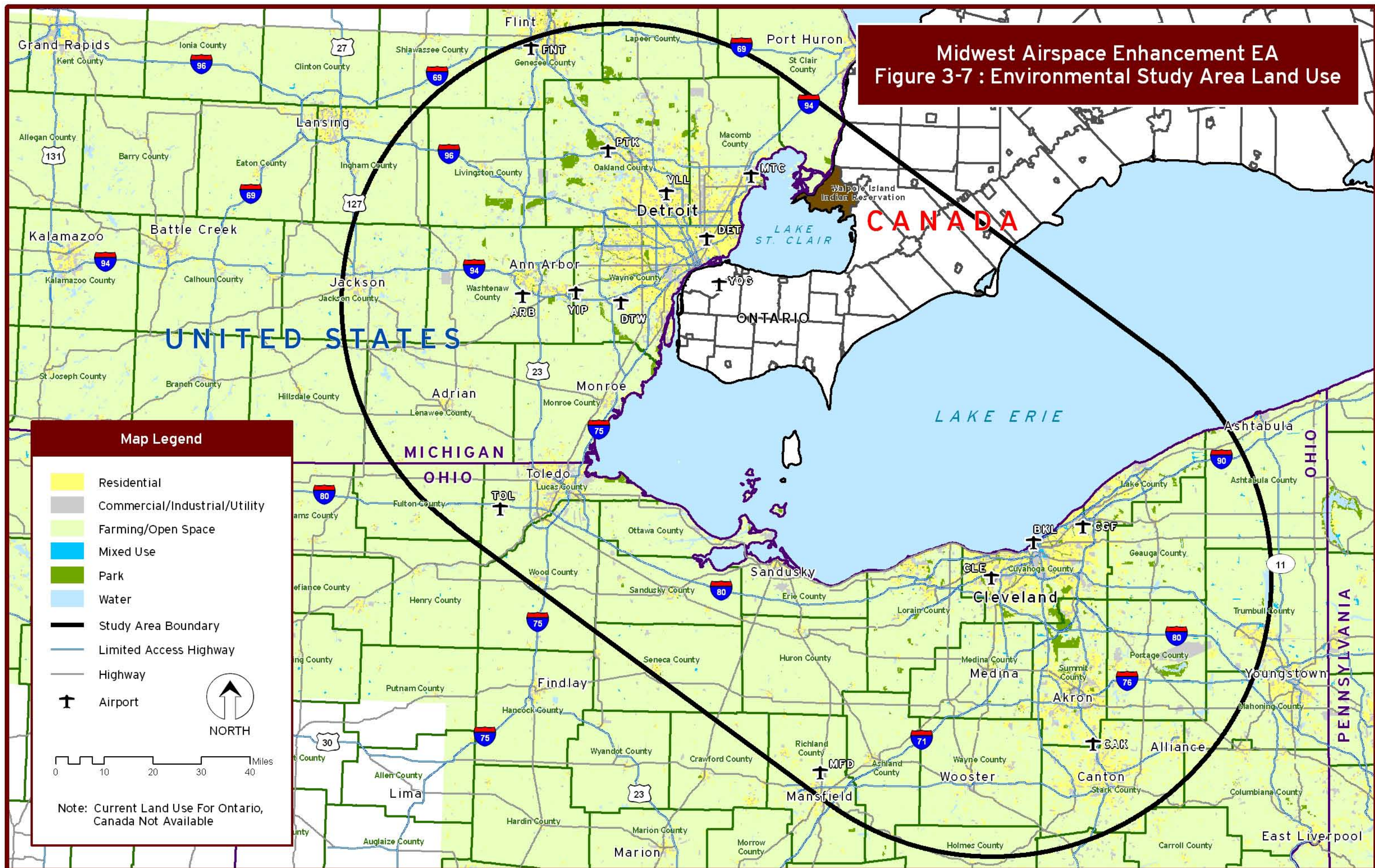
**Figure 3-7** illustrates generalized land use within the Environmental Study Area, while **Figures 3-8 and 3-9** depict land use in the vicinity of CLE and DTW. Land use in the Environmental Study Area includes dense residential and commercial/industrial development in and around metropolitan areas, and predominantly farms/open space in rural areas. Information on existing land use was obtained from the United States

Geological Survey (USGS) and counties in the vicinity of CLE and DTW. Detailed information on the development of land use and population data is contained in **Appendix E**.

#### 3.2.2.1 Native American Lands

The Walpole Island Indian Reservation is located in the northeastern corner of Lake St. Clair in Ontario, Canada, as shown in **Figure 3-7**. The Reservation is home to approximately 1,500 Native Americans and covers approximately 85 square miles.







Midwest Airspace Enhancement EA  
Figure 3-8 : CLE Area Land Use

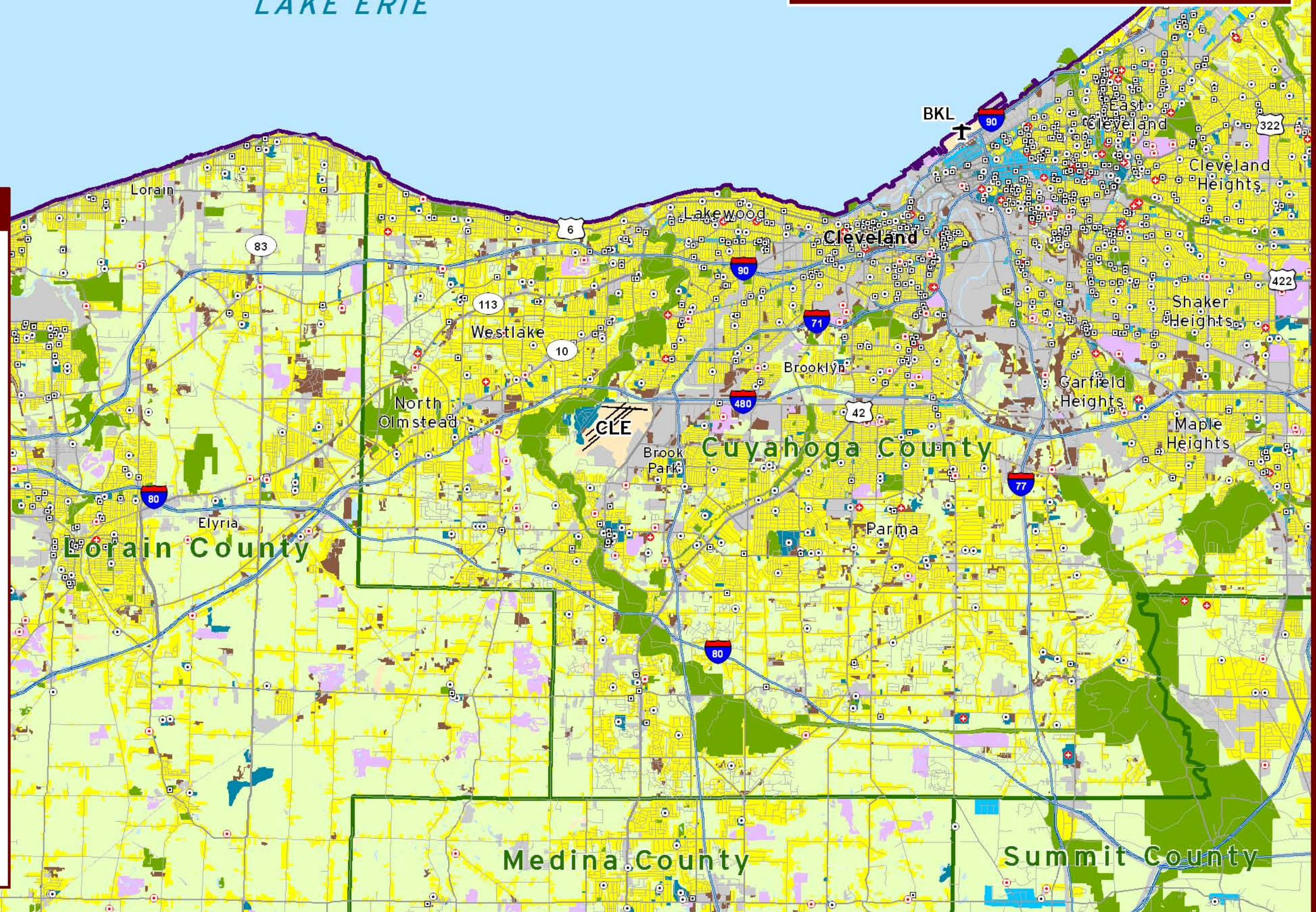
LAKE ERIE

Map Legend

- School
- ⛔ Hospital
- ⛓ Place of Worship
- ⦿ Cemetery
- Residential
- Commercial/Industrial/Utility
- Farming/Open Space
- Cultural/Recreation/Cemetery
- Institutional
- Vacant/Under Development
- Park
- Water
- Mixed Use
- Airport
- Limited Access Highway
- Highway
- Major Road
- ✈ Airport

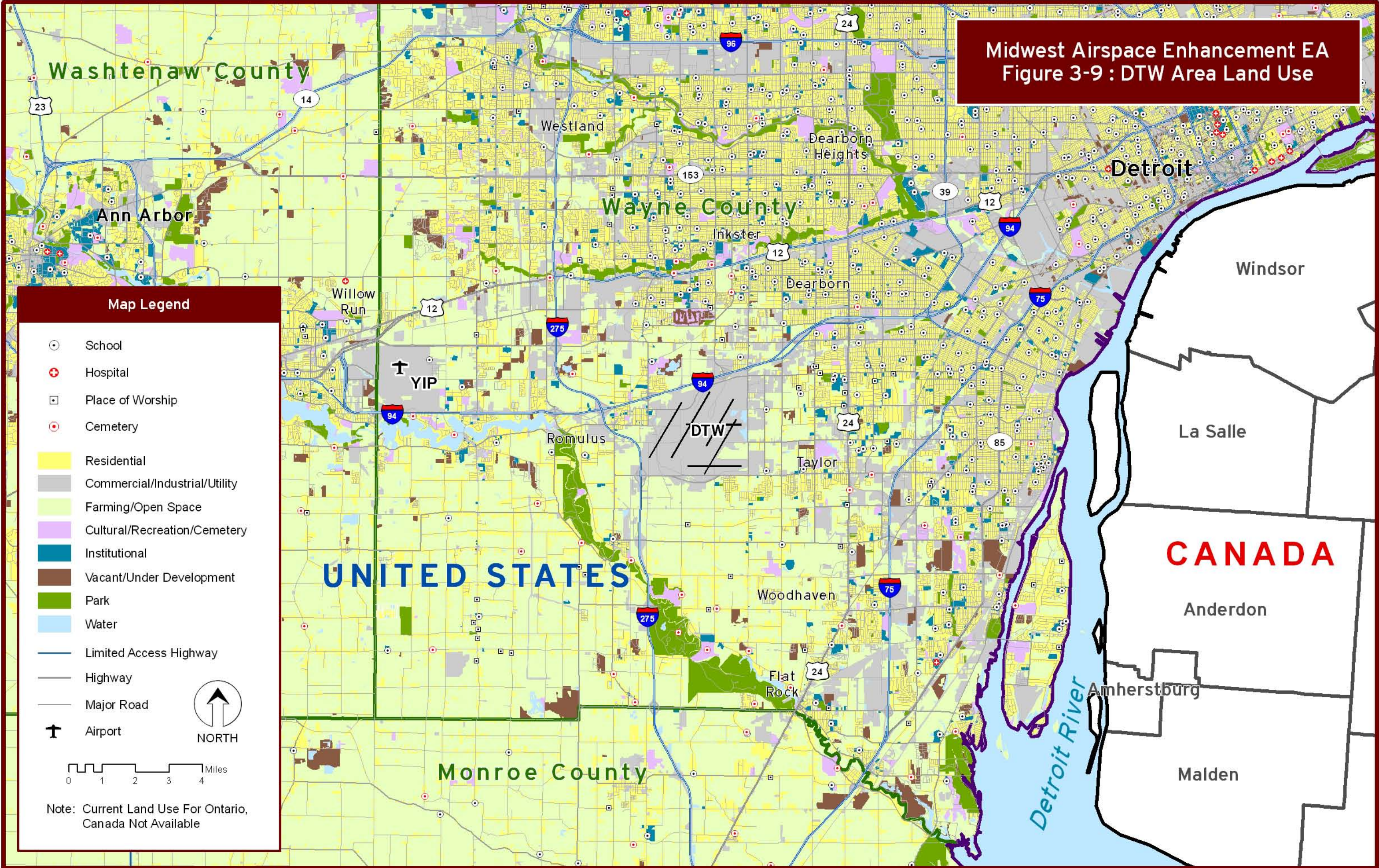


0 0.5 1 2 3 4 Miles





Midwest Airspace Enhancement EA  
Figure 3-9 : DTW Area Land Use





There are no Native American lands within the Environmental Study Area in the states of Ohio or Michigan.<sup>10</sup>

### 3.2.2.2 Demographics

This section describes the 2000 U.S. Census demographic statistics for the counties in which the primary airports are located; that is Cuyahoga County, Ohio for CLE and Wayne County, Michigan for DTW. In the interest of brevity, only data for Cuyahoga and Wayne counties is presented in this section as they are the primary airports in the Environmental Study Area. However, current and projected demographic data is collected for all counties in the Environmental Study Area and is

incorporated into the GIS database that is used to assess environmental consequences.

Demographic data is used to assess potential impacts to people, socioeconomic impacts, and impacts to minority and low-income populations under environmental justice considerations. **Table 3-5** summarizes the demographic data in the vicinity of CLE and DTW, including information on population, median income, and employment. Employment opportunities created by the airports are provided for on-airport, off-airport, and indirectly related businesses. Information is also provided on the service and retail industries, as they are major generators of business-related aviation activity.

**Table 3-5**

#### **Demographic Statistics**

<b>Demographic Factor</b>	<b>County and Airport</b>	
	<b>Cuyahoga County, Ohio (CLE)</b>	<b>Wayne County, Michigan (DTW)</b>
<b>Population</b>		
2000 Population <sup>(1)</sup>	1,393,978	2,061,162
Per Capita Income <sup>(1)</sup>	\$22,272	\$20,058
<b>Income</b>		
Median Household Income <sup>(1)</sup>	\$39,168	\$40,776
Median Family Income <sup>(1)</sup>	\$49,559	\$48,805
<b>Employment</b>		
Population eligible for employment <sup>(1)</sup>	1,083,541	930,640
Employment in civilian labor force <sup>(1)</sup>	634,419	851,110
Employment in Armed Forces <sup>(1)</sup>	677	421
Unemployment in civilian labor force <sup>(1)</sup>	41,778	79,109
Population not in labor force <sup>(1)</sup>	406,667	610,819
<b>Aviation Employment Statistics</b>		
Employment at Airport	5,600	18,000
Economic Impact on Region	\$143 million <sup>(2)</sup>	\$5.2 billion annually <sup>(3)</sup>
Retail Industry Employment <sup>(1)</sup>	10.8%	10.7%
Service Industry Employment <sup>(1)</sup>	43.9%	40.8%

Note: Monetary values expressed in 1999 dollars.

Sources:

(1) U.S. Bureau of the Census, Census 2000.

(2) City of Cleveland, total revenue plus operating expenses,

[http://www.city.cleveland.oh.us/government/departments/finance/frc/pdf/2002/2002\\_Airport.pdf](http://www.city.cleveland.oh.us/government/departments/finance/frc/pdf/2002/2002_Airport.pdf), Feb. 3, 2005.

(3) Detroit Metro Airport, <http://www.metroairport.com/about/facts.asp>, February 2, 2005.



**Table 3-6** provides statistics on minority and low-income populations within Cuyahoga and Wayne Counties, as well as statewide and nationwide statistics for comparison purposes. The Department of Transportation Order on Environmental Justice defines low-income as “a person whose median household income is at or below the Department of Health and Human Services poverty guidelines.”<sup>11</sup> Minority populations are defined as:

- Black - a person having origins in any of the black racial groups of Africa;
- Hispanic - a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race;
- Asian American - a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands; or

- American Indian and Alaskan Native - a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition.<sup>12</sup>

### 3.2.3 Parks and Natural Areas

Section 4(f) of the Department of Transportation Act of 1966<sup>13</sup> (later recodified as 49 USC Section 303(c)) states that the “...Secretary of Transportation will not approve a project that requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land from a historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land...and [unless] the project includes all possible planning to minimize harm resulting from the use.”<sup>14</sup>

**Table 3-6**

#### Minority and Low-Income Population Statistics

Demographic Factor	County and Airport	
	Cuyahoga County, Ohio CLE	Wayne County, Michigan DTW
<b>Minority Population Statistics</b>		
Minority Population	457,486 <sup>(1)</sup>	988,967 <sup>(2)</sup>
% of Total County Population	32.8%	48.0%
% of Total State Population	14.8%	19.9%
% of Total National Population	29.3%	29.3%
<b>Low-Income Population Statistics <sup>(3)</sup></b>		
Low-Income Population	179,372	332,598
% of Total County Population	13.1%	16.4%
% of Total State Population	10.6%	10.5%
% of Total National Population	12.4%	12.4%

Notes:

(1) 44,707 residents of Cuyahoga County, OH reported Native Hawaiian or Other Pacific Islander, some other race, or two or more races to the Census Bureau (accounting for 3.2% of the population).

(2) 83,795 residents of Wayne County, MI reported Native Hawaiian or Other Pacific Islander, some other race, or two or more races to the Census Bureau (accounting for 4.1% of the population).

(3) Poverty levels used are those designated by the U.S. Bureau of the Census for the year 2000.<sup>15</sup>

Source: U.S. Bureau of the Census, Census 2000



The term “use” encompasses both direct and indirect impacts to Section 4(f) properties. Direct use is the physical taking of the 4(f) property. Indirect adverse impacts such as noise that prevent the use of Section 4(f) properties for their intended purpose are considered as constituting a “constructive use,” that is a taking of the property.

FAA has established guidelines for aircraft noise and land use compatibility under 14 CFR Part 150. Part 150 is limited, however, in its ability to assess the impact of noise in areas where quiet and serenity are expected. Special consideration is given to parks and natural areas where a quiet setting is a generally recognized purpose and attribute. In these areas the FAA official “must consult all appropriate federal, state, and local officials having jurisdiction over the affected property’s impacts on Section 4(f) resources.”<sup>18</sup>

Since there is the potential for the Proposed Action to “use” 4(f) properties, this section describes the parks and natural areas located within the Environmental Study Area. Natural areas, as defined for the purpose of this document, include wildlife refuges, forests, wildlife management areas, and other places that are considered recreationally and environmentally significant. The Environmental Study Area has numerous city, county, state, and federally maintained parks as well as other natural areas. Federal and state areas are depicted in **Figure 3-10** and correlated with a reference number from **Tables 3-5 and 3-6**.

Many Section 4(f) properties are also subject to the Section 6(f) of the Land and Water Conservation Fund (LWCF) Act.<sup>19</sup> Section 6(f) states that no public outdoor recreation areas acquired or developed with any LWCF assistance can be converted to non-recreation uses without the approval of the

Secretary of the Interior. The Secretary of the Interior may only approve conversions if they are in accordance with the comprehensive statewide outdoor recreation plan and if the converted areas will be replaced with other recreation lands of reasonably equivalent usefulness and location.

The following subsections address National Parks and Service Lands, the National Forest System, and State Parks/Forests and other areas of state significance.

### 3.2.3.1 National Parks Service Lands

**Table 3-7** provides a list and **Figure 3-10** illustrates the National Park Service Lands identified in the Environmental Study Area.

### 3.2.3.2 National Forest System

There are no National Forests within the Environmental Study Area.

### 3.2.3.3 National Wildlife Refuge System

The United States Department of the Interior Fish & Wildlife Service is responsible for the administration of the National Wildlife Refuge System. The National Wildlife Refuge System operates:

- To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered;
- To perpetuate the migratory bird resource;
- To preserve a natural diversity and abundance of fauna and flora on refuge lands; and



Midwest Airspace Enhancement EA  
Figure 3-10 : National And State Park  
And Natural Areas

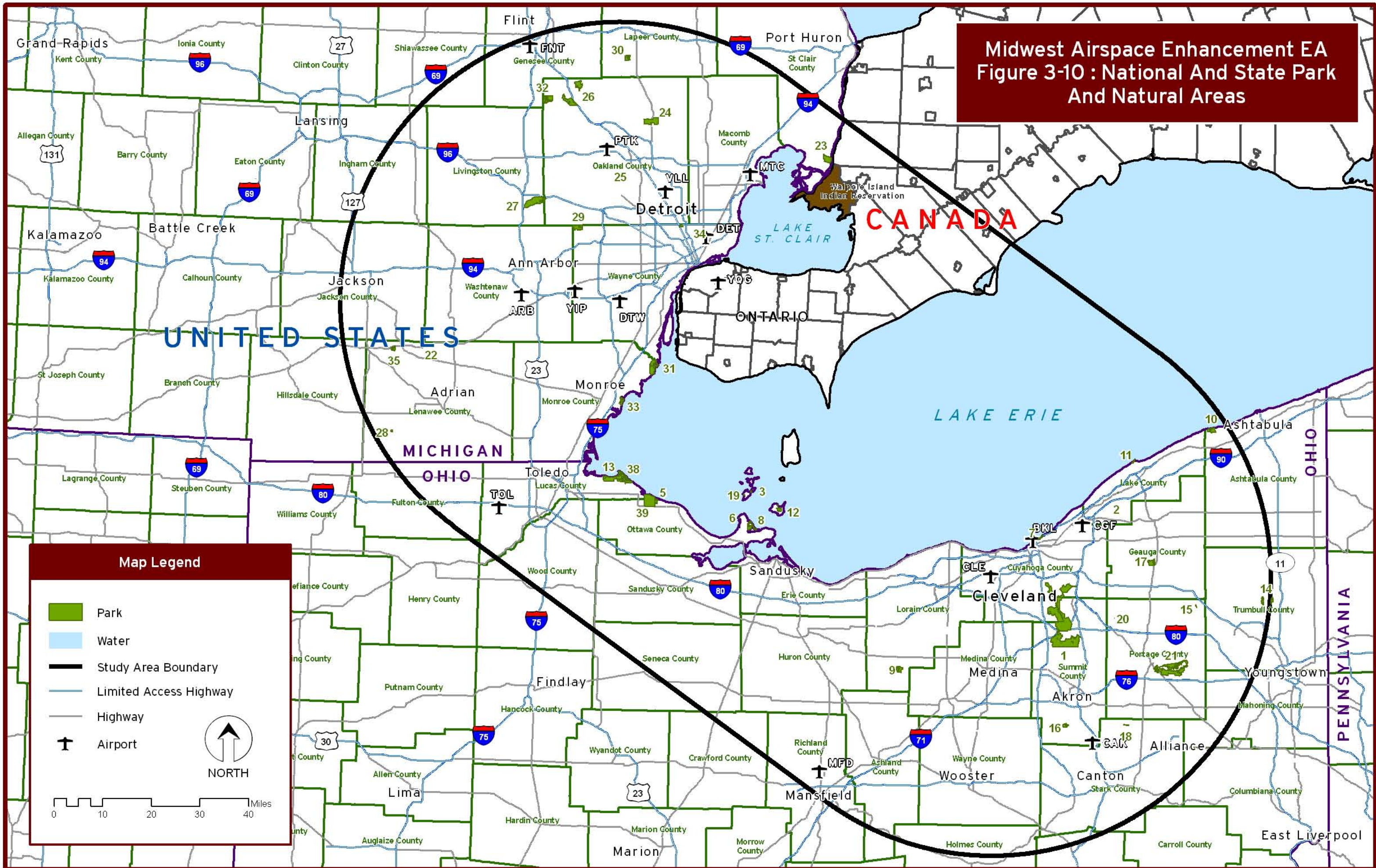




Table 3-7

## National Park Service Lands

Name	County	Acreage	Figure 3-10 Reference
Cuyahoga Valley National Park	Cuyahoga and Summit Counties, Ohio	33,000	1
James A. Garfield National Historic Site	Lake County, Ohio	8	2
Perry's Victory and International Peace Memorial	Ottawa County, Ohio	25	3
Point Pelee National Park	Essex County, Ontario, Canada	3,954	4

Sources:

US Department of the Interior, National Park Service.

Parks Canada Agency (See [www.pc.gc.ca/index\\_e.asp](http://www.pc.gc.ca/index_e.asp))

- To provide an understanding and appreciation of fish and wildlife ecology and people's role in their environment and to provide refuge visitors with high quality, safe, wholesome and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.<sup>20</sup>

As shown in **Figure 3-10**, Cedar Point National Wildlife Refuge, located in Lucas County, Ohio, and Ottawa National Wildlife Refuge, located in Lucas and Ottawa Counties, are the only National Wildlife Refuges in the Environmental Study Area. They are identified by reference numbers 38 and 39, respectively, on **Figure 3-10**.

#### 3.2.3.4 State Parks, Forests and Other Areas of Significance

Within the Environmental Study Area there are approximately 930 public parks and open space areas, including forest preserves. There are 35 state parks, forests, and areas of state significance and 893 local and municipal parks. **Table 3-8** lists and **Figure 3-10** illustrates the state parks, forests and other areas (e.g. fairgrounds and Wildlife

Management Areas) of state significance identified in the Environmental Study Area. Due to the large number of local and municipal parks located within the Environmental Study Area, these sites are not listed in this chapter. However these sites are considered in the assessment of 4(f) impacts discussed in the Environmental Consequences chapter.

#### 3.2.4 Historical, Archaeological, Architectural and Cultural Resources

A number of federal laws and regulations address protection of the country's cultural resources. The statute specifically devoted to cultural resource issues is the National Historic Preservation Act of 1966 (16 USC 470), as amended, which contains two provisions that are pertinent to changes in aircraft routing.

Section 106 of the Act requires federal agencies to consider the effect of federally funded or licensed projects on properties and districts listed, or eligible for listing, in the National Register of Historic Places (NRHP).<sup>21</sup> National Historic Landmarks, a designation bestowed on a limited number



Table 3-8

## State Parks, Forests, and Areas of Significance

Name	County	Acreage	Figure 3-10 Reference
<b>Ohio</b>			
Crane Creek State Park	Ottawa, Lucas	42	5
Catawba Island State Park	Ottawa	18	6
Cleveland Lakefront State Park	Cuyahoga	104	7
East Harbor State Park	Ottawa	1,831	8
Findley State Park	Lorain	838	9
Geneva State Park	Ashtabula	698	10
Headlands Beach State Park	Lake	120	11
Kellys Island State Park	Erie	677	12
Maumee Bay State Park	Lucas	1,336	13
Mosquito State Park	Trumbull	2,483	14
Nelson Kennedy State Park	Portage	167	15
Portage Lakes State Park	Summit	411	16
Punderson State Park	Geauga	741	17
Quail Hollow State Park	Stark, Portage	701	18
South Bass Island State Park	Ottawa	32	19
Tinkers Creek State Park	Portage	355	20
West Branch State Park	Portage	5,379	21
<b>Michigan</b>			
Walter Hayes State Park	Lenawee, Jackson,	654	22
Algonac State Park	Saint Clair	1,450	23
Bald Mountain State Park	Oakland	4,637	24
Dodge State Park 4	Oakland	139	25
Holly State Recreation Area	Oakland	2,817	26
Island Lake State Park	Livingston	4,000	27
Lake Hudson State Park	Lenawee	2,796	28
Maybury State Park	Wayne	944	29
Metamora Hadley State Park	Lapeer	723	30
Pointe Mouille State Game Area	Wayne	NA	31
Seven Lakes State Park	Oakland	1,434	32
Sterling State Park	Monroe	1,000	33
Michigan State Fairgrounds	Wayne	NA	34
Onsted State Wildlife Management Area	Lenawee	NA	35
<b>Ontario</b>			
Wheatley Provincial Park		596	36
Rondeau Provincial Park		8,041	37

## Sources:

Ohio Department of Natural Resources, [www.dnr.state.oh.us](http://www.dnr.state.oh.us).Michigan Department of Natural Resources, [www.dnr.state.mi.us](http://www.dnr.state.mi.us).Parks Canada Agency, [www.pc.gc.ca/index\\_e.asp](http://www.pc.gc.ca/index_e.asp).



of particularly significant cultural resources, are afforded special protection under Section 110 of the National Historic Preservation Act.<sup>24</sup> NRHP has established standards by which individual resources (both archaeological and architectural) are evaluated to determine their eligibility for listing. Resources may include buildings, sites, objects, and structures and are placed on the NRHP in reference to their: (1) association with events that have made a significant contribution to the broad patterns of American history; (2) association with the lives of persons significant in our past; (3) architectural or archaeological significance; and/or (4) ability to yield information important in prehistory or history.<sup>25</sup>

A broader range of cultural resources are protected under Section 4(f) of the Department of Transportation Act of 1966 which requires projects funded by the DOT to avoid “any significant historic site” unless there is no “feasible or prudent” alternative. This provision generally applies to resources listed, or eligible for listing, in the National Register of Historic Places. At the discretion of the FAA, Section 4(f) protection may be applied to properties that do not meet the criteria for National Register eligibility if the responsible jurisdiction advocates Section 4(f) status.

Although implementation of the Proposed Action does not require the physical taking of any cultural resource, the Proposed Action may result in an indirect impact to cultural resources. Indirect adverse impacts such as noise may be considered a “constructive use” or taking of the property. Therefore, cultural resources in the Environmental Study Area have been identified as shown in **Figure 3-11**. A comprehensive list of historic resource sites is included in **Appendix F**.

### 3.2.5 Air Quality

Existing air quality conditions within the Environmental Study Area are described in this section, as is general information on national air quality standards.

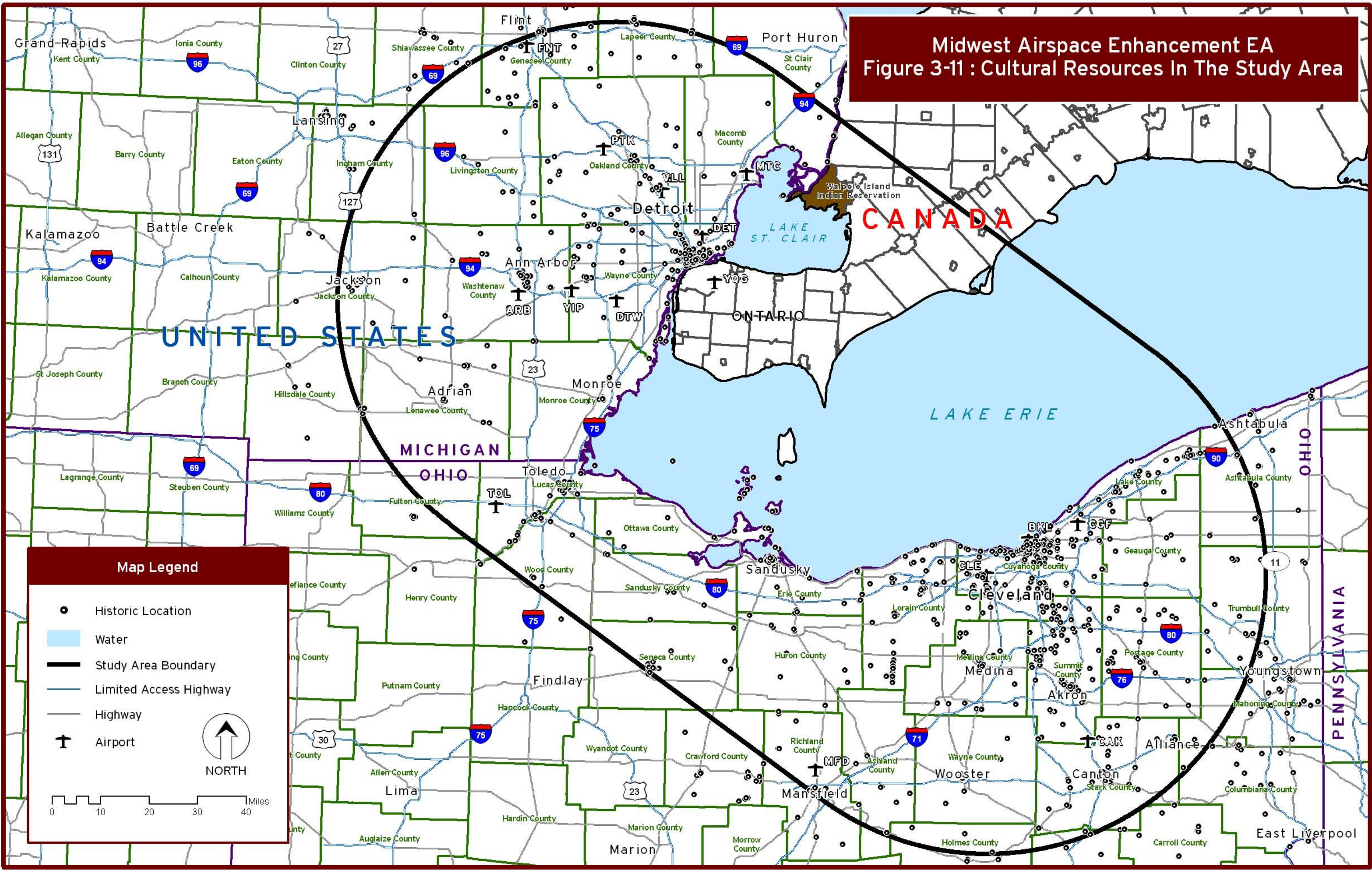
The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for ambient (i.e., outdoor) concentrations of the following criteria pollutants: Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Ozone (ground-level O<sub>3</sub>), Sulfur Dioxide (SO<sub>2</sub>), Lead (Pb), and particulate matter with a diameter of 10 microns or less (PM<sub>10</sub> and PM<sub>2.5</sub>). Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

States must identify geographic areas that do not meet the NAAQS for each criteria pollutant. These areas are then identified as non-attainment areas for the applicable criteria pollutant(s). States must develop a State Implementation Plan (SIP) for non-attainment areas that includes a variety of emission control measures that the state deems necessary to produce attainment of the applicable standard(s) in the future. If a SIP already exists, it must be revised if an area becomes non-attainment for a criteria pollutant.

An area previously designated non-attainment pursuant to the Clean Air Act (CAA) Amendments of 1990 and subsequently re-designated as attainment, is termed a maintenance area. A maintenance area must have a maintenance plan in a revision to a SIP to ensure attainment of the



Midwest Airspace Enhancement EA  
Figure 3-11 : Cultural Resources In The Study Area



**Map Legend**

- Historic Location
- Water
- Study Area Boundary
- Limited Access Highway
- Highway
- Airport

NORTH

0 10 20 30 40 Miles



air quality standards is maintained. In summary:

- An attainment area is any area that meets the national primary or secondary ambient air quality standard for a given pollutant,
- A non-attainment area is any area that does not meet the national primary or secondary ambient air quality standard for a given pollutant,
- A maintenance area is any geographic area previously designated non-attainment pursuant the CAA Amendments of 1990 and subsequently re-designated as attainment.

### 3.2.5.1 Carbon Monoxide (CO)

CO is a colorless, odorless and poisonous gas produced by incompletely burned carbon in fuels. The majority of CO emissions are from transportation sources, with the largest from highway motor vehicles. CO molecules survive in the atmosphere for a period of approximately one month, but eventually react with oxygen to form carbon dioxide. CO levels found in ambient air may reduce the oxygen carrying capacity of the blood. Health threats are most serious for those with angina or peripheral vascular disease. Exposure to elevated CO levels can cause impairment of

visual perception, manual dexterity, learning ability and performance of complex tasks. There are no areas within the Environmental Study Area designated non-attainment for CO; however, there are several areas designated as maintenance areas for CO as shown in **Table 3-9** and **Figure 3-12**.

### 3.2.5.2 Nitrogen Dioxide (NO<sub>2</sub>)

NO<sub>2</sub> is a brownish, highly reactive gas that is present in all urban atmospheres. NO<sub>2</sub> can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Nitrogen oxides are an important precursor both to O<sub>3</sub> and acid rain, and may affect both terrestrial and aquatic ecosystems. The major mechanism for the formation of NO<sub>2</sub> in the atmosphere is the oxidation of the primary air pollutant nitric oxide (NO). Nitrogen oxides (NO<sub>x</sub>) play a major role, together with volatile organic compounds (VOCs), in the atmospheric reactions that produce ozone (ground level O<sub>3</sub>, see the following subsection). NO<sub>x</sub> forms when fuel is burned at high temperatures. The two major emissions sources are transportation and stationary fuel combustion sources such as electric utility and industrial boilers. There are no areas within the Environmental Study Area designated non-attainment for NO<sub>2</sub>.

**Table 3-9**

#### **CO Maintenance Areas in the Environmental Study Area**

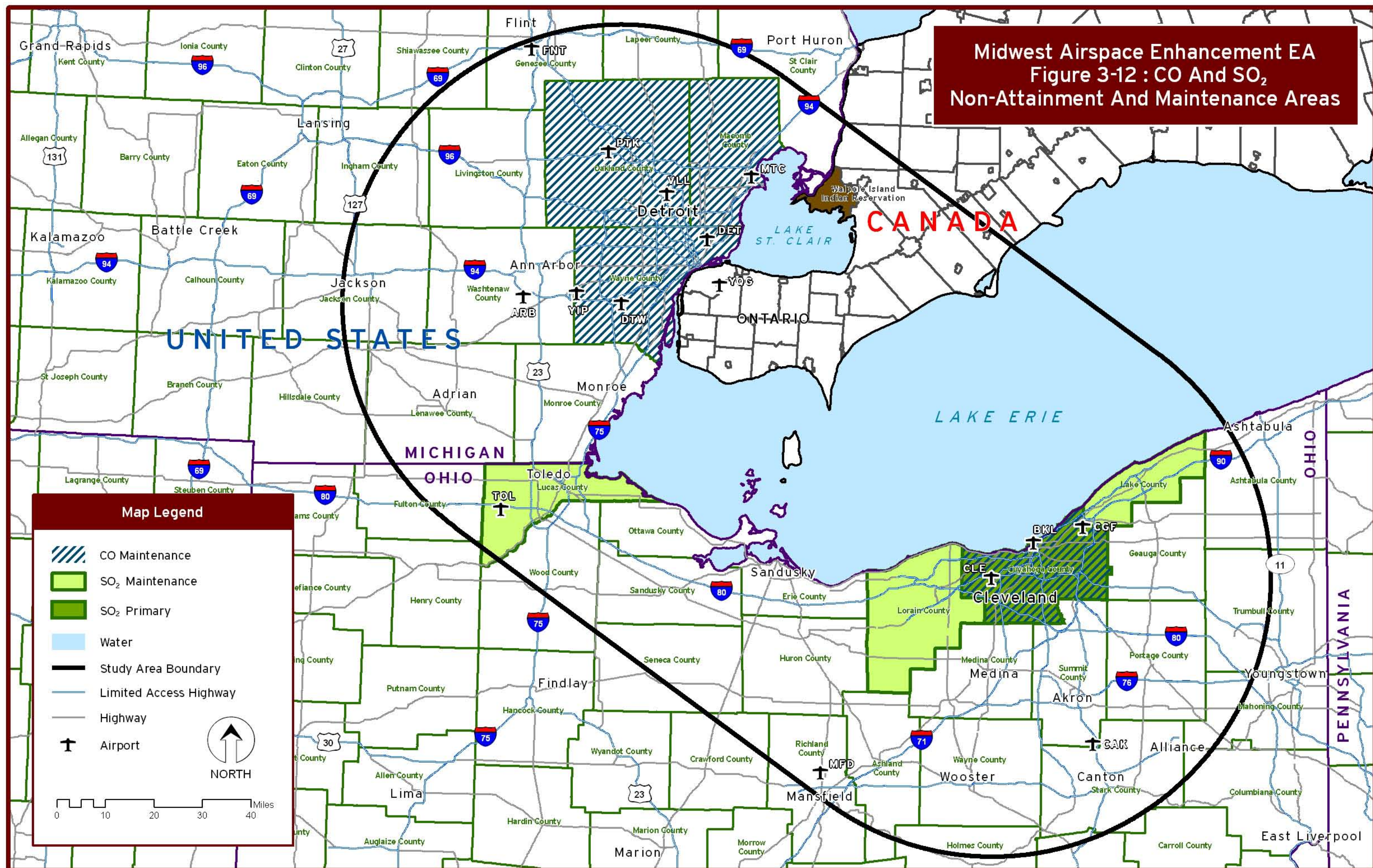
<b>State</b>	<b>County/Cities</b>
<b>Michigan</b>	Macomb County Oakland County Wayne County
<b>Ohio</b>	Cuyahoga County/Cleveland

Source:

US EPA Office of Air Quality Planning & Standards, Green Book, available online at:

<http://www.epa.gov/oar/oaqps/greenbk/> (accessed January 31, 2005); status as of November 29, 2004.







### 3.2.5.3 Ozone

Ozone is a colorless gas composed of three atoms of oxygen, one more than the oxygen molecule that people need to breathe. The additional oxygen atom makes ozone extremely reactive and irritating to tissue in the respiratory system. Ozone exists naturally in the Earth's upper atmosphere (i.e., the stratosphere) where it shields the Earth from the sun's ultraviolet rays. However, ozone found close to the Earth's surface, called ground-level ozone, is an air pollutant.

Ozone is formed by a complex series of chemical reactions between VOCs and NO<sub>x</sub> in the presence of sunlight during hot, stagnant summer days. The primary manmade sources of VOCs and NO<sub>x</sub> are industrial and automobile emissions. Other sources of VOCs include aircraft, airport ground support equipment, lawn and garden equipment, and consumer products such as paints, insecticides, and cleaners. Ozone concentrations can reach unhealthy levels when the weather is hot and sunny with little or no wind. High ozone levels usually occur between 1 p.m. and 7 p.m. from May through September. High concentrations of ozone may cause inflammation and irritation of the respiratory tract, particularly during heavy physical activity. Not only are there negative health effects for humans, but there is clear evidence that ozone harms vegetation and forests.

On April 15, 2004, the EPA issued the final designations for areas across the country for the 8-hour ozone standard. Designations and classifications took effect on June 15, 2004. Areas categorized as basic non-attainment (i.e., Subpart 1) will have to comply with the more general non-attainment requirements of the CAA (i.e., attainment deadlines 5-10 years after designation). The EPA has issued the first

phase of the final implementation rule which addresses two key implementation issues: (1) classifications for the 8-hour standard and (2) transitioning from the 1-hour to the 8-hour standard. This action outlines the first steps communities will have to take to maintain or improve their air quality. EPA will issue the second phase of the final 8-hour ozone implementation rule which will address many of the planning and control obligations that will apply for purposes of implementing the 8-hour ozone NAAQS. To meet the requirements of the CAA, the states will be required to develop a SIP by April 2007.

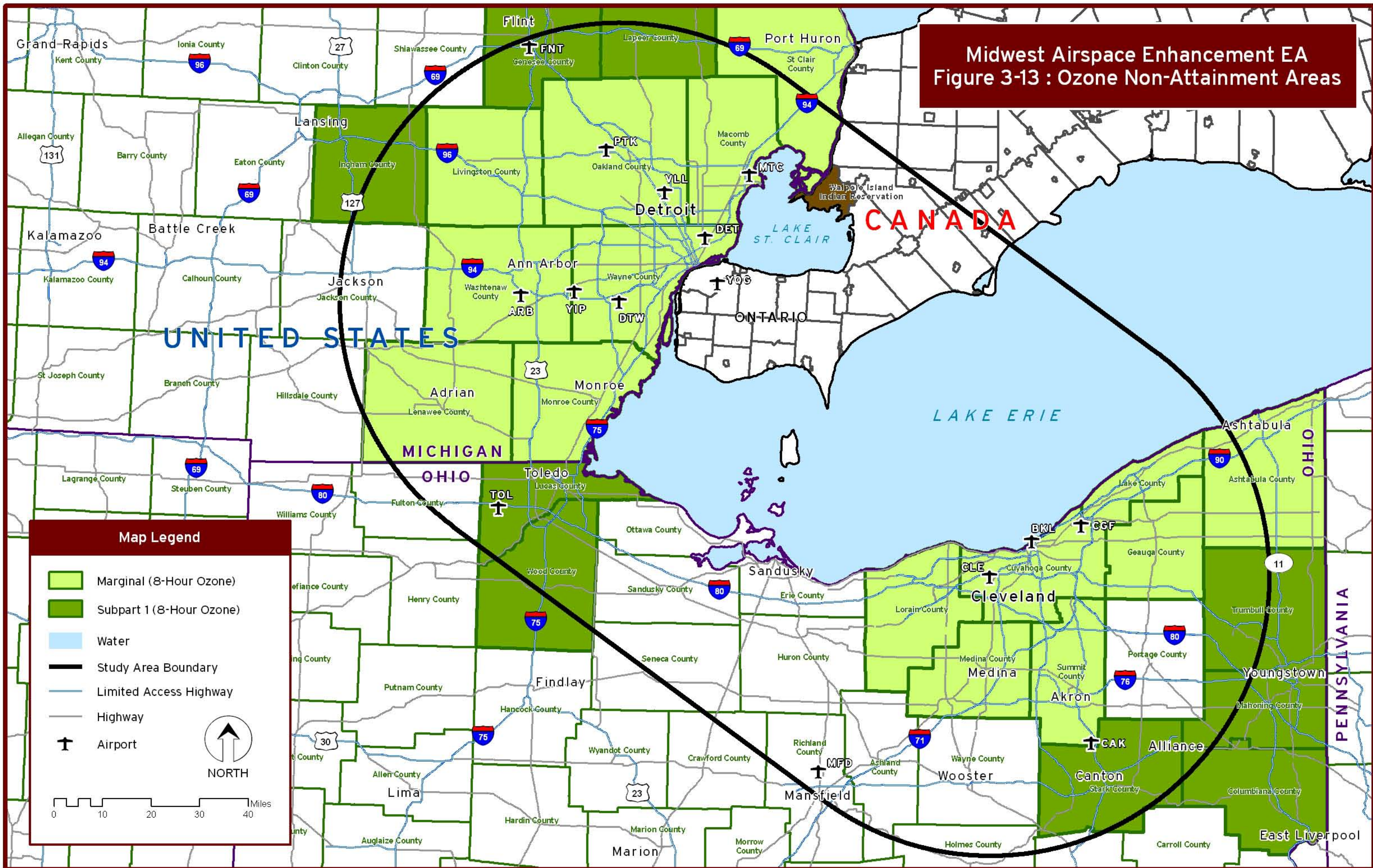
There are several areas located within the Environmental Study Area that have been classified by the EPA as being in non-attainment for the 8-hour ozone standards, as shown in **Table 3-10** and **Figure 3-13**.

### 3.2.5.4 Sulfur Dioxide (SO<sub>2</sub>)

When a sulfur bearing fuel is combusted, the sulfur is oxidized to form SO<sub>2</sub>. Natural sources of SO<sub>2</sub> include releases from volcanoes, oceans, biological decay and forest fires. The most important man-made sources of SO<sub>2</sub> are fossil fuel combustion, smelting, manufacture of sulfuric acid, conversion of wood pulp to paper, incineration of refuse and production of elemental sulfur. High concentrations of SO<sub>2</sub> affect breathing and may aggravate existing respiratory and cardiovascular disease. SO<sub>2</sub> is also a primary contributor to acid rain, which causes acidification of lakes and streams. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. **Table 3-11** and **Figure 3-12** show SO<sub>2</sub> non-attainment and maintenance areas in the Environmental Study Area.



Midwest Airspace Enhancement EA  
Figure 3-13 : Ozone Non-Attainment Areas





**Table 3-10****8-hour Ozone Non-Attainment Areas in the Environmental Study Area**

<b>State</b>	<b>County</b>	<b>Classification Standard</b>
Michigan	Genesee County	Subpart 1
	Ingham County	Subpart 1
	Lapeer County	Subpart 1
	Lenawee County	Marginal
	Livingston County	Marginal
	Macomb County	Marginal
	Monroe County	Marginal
	Oakland County	Marginal
	St. Clair County	Marginal
	Washtenaw County	Marginal
	Wayne County	Marginal
Ohio	Ashtabula County	Moderate
	Columbiana County	Subpart 1
	Cuyahoga County	Moderate
	Geauga County	Moderate
	Lake County	Moderate
	Lorain County	Moderate
	Lucas County	Subpart 1
	Mahoning County	Subpart 1
	Medina County	Moderate
	Stark County	Subpart 1
	Summit County	Moderate
	Trumbull County	Subpart 1
	Wood County	Subpart 1

Note: See text for information on classification standard.

Source:

US EPA Office of Air Quality Planning & Standards, Green Book, available online at:  
<http://www.epa.gov/oar/oaqps/greenbk/> (accessed January 31, 2005). Status as of November 29, 2004.

**Table 3-11****SO<sub>2</sub> Non-Attainment and Maintenance Areas in the Environmental Study Area**

<b>State</b>	<b>County/Cities</b>	<b>Classification Standard</b>
Ohio	Cuyahoga County	Non-Attainment Primary
	Lake County	Maintenance
	Lorain County	Maintenance
	Lucas County	Maintenance

Source:

US EPA Office of Air Quality Planning & Standards, Green Book, available online at:  
<http://www.epa.gov/oar/oaqps/greenbk/> (accessed January 31, 2005). Status as of November 29, 2004.



### 3.2.5.5 Lead (Pb)

The majority of atmospheric lead comes from lead gasoline additives, non-ferrous smelters, and battery plants. Exposure to lead can cause seizures and lead to mental retardation and behavioral disorders. Due to several EPA pollution control programs, lead levels in humans have dramatically declined in recent decades. Beginning in the 1970s, the EPA lowered the amount of lead allowed in gasoline, and facilitated the switch to unleaded gasoline as the primary fuel for highway vehicles. This switch virtually eliminated lead violations in urban areas with no point sources.<sup>27</sup> Consequently, no counties in the Environmental Study Area are in non-attainment or maintenance areas for lead.

### 3.2.5.6 Particulate Matter (PM)

Air pollutants considered as particulate matter include dust, dirt, soot, smoke, and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activities, fires, and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as SO<sub>2</sub> and VOCs are also considered particulate matter. Based on studies of human populations exposed to high concentrations of particles and laboratory studies of animals and humans, there are major effects to human health from particulate matter. These include effects on breathing and respiratory symptoms, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogens, and premature death. Particulate matter also soils and damages materials and is a major cause of visibility impairment.

Since July 1, 1987, the EPA has used the indicator PM<sub>10</sub> which includes only those

particles with aerodynamic diameter smaller than 10 micrometers. These smaller particles are likely responsible for most of the adverse health effects of particulate matter because of their ability to reach the thoracic, or lower, regions of the respiratory tract.

The PM spectrum includes both coarse and fine particles. While the main distinction between coarse and fine particles is the process by which they are produced, EPA and epidemiologists who study the health effects of particulate pollution identify coarse and fine particles through rough approximations of those particles' diameters. Coarse particles, which become airborne usually from the crushing and grinding of solids, generally have diameters between 2.5 and 10 micrometers and are identified by the indicator PM<sub>10-2.5</sub>. Fine particles, indicated by PM<sub>2.5</sub>, come mainly from combustion of gases and have diameters of 2.5 micrometers or less.

The EPA has developed PM<sub>2.5</sub> air quality standards. However, the proposed rulemaking to: (1) amend the conformity regulations to specifically include PM<sub>2.5</sub> as a criteria pollutant subject to transportation conformity, and (2) to outline the specific conformity requirements that would apply in newly designated PM<sub>2.5</sub> non-attainment areas, is still being negotiated.

**Figure 3-14** and **Table 3-12** show the PM non-attainment areas within the Environmental Study Area. Under the current standards, no counties in the Environmental Study Area are designated as non-attainment for PM<sub>10</sub>. Two counties are designated as maintenance areas for PM<sub>10</sub>. Nineteen counties in the Environmental Study Area were designated as non-attainment for PM<sub>2.5</sub>.



Midwest Airspace Enhancement EA  
Figure 3-14 : Particulate Matter  
Non-Attainment And Maintenance Areas

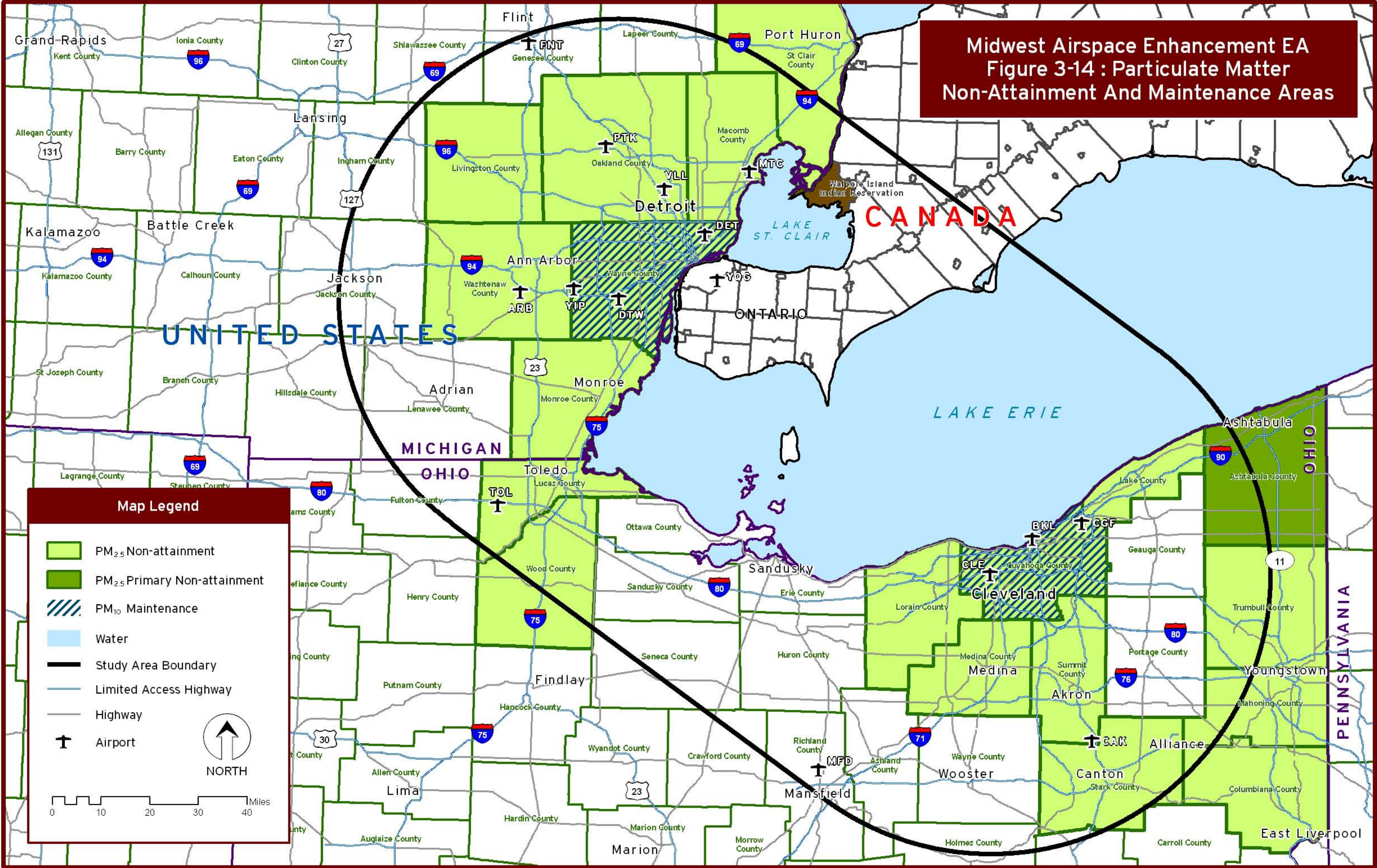




Table 3-12

**Particulate Matter Non-Attainment and Maintenance Areas in the Environmental Study Area**

<b>Pollutant</b>	<b>State/District</b>	<b>County/Cities</b>	<b>Classification Standard</b>
PM <sub>10</sub>	Michigan	Wayne County	Maintenance
	Ohio	Cuyahoga County	Maintenance
PM <sub>2.5</sub>	Michigan	Livingston County	Non-attainment
		Macomb County	Non-attainment
		Monroe County	Non-attainment
		Oakland County	Non-attainment
		St. Clair County	Non-attainment
		Washtenaw County	Non-attainment
		Wayne County	Non-attainment
	Ohio	Ashtabula County	Primary Non-attainment
		Columbiana County	Non-attainment
		Cuyahoga County	Non-attainment
		Lake County	Non-attainment
		Lorain County	Non-attainment
		Lucas County	Non-attainment
		Mahoning County	Non-attainment
		Medina County	Non-attainment
		Stark County	Non-attainment
		Summit County	Non-attainment
		Trumbull County	Non-attainment
		Wood County	Non-attainment

Source:

US EPA Office of Air Quality Planning &amp; Standards, Green Book, available online at:

<http://www.epa.gov/oar/oaqps/greenbk/> (accessed January 31, 2005); status as of November 29, 2004.**3.2.6 Wildlife**

This section describes the affected environment as related to threatened and endangered species and migratory bird patterns. Avian species in the study may be impacted by changes to aircraft routing.

**3.2.6.1 Threatened and Endangered Species**

Section 7 of the Endangered Species Act of 1973 provides protection to any wildlife, which includes endangered plants or animals. In compliance with this law, as amended, federal agencies are required to ensure developments/improvements will not jeopardize the continued existence of threatened or endangered species, or result

in the destruction or adverse modification of the critical habitat of such species. Endangered species are defined as those in danger of extinction throughout all or a significant portion of its range. Threatened species are defined as any species that are likely to become an endangered species, within the foreseeable future, throughout all or a significant portion of its range.

Thirteen animals and eight plants are currently listed as threatened or endangered in Michigan. Twenty animals and six plants have been identified as threatened or endangered in Ohio. A comprehensive list of federally recognized threatened and endangered species may be found in **Table 3-13. Appendix G** contains a list of all state listed threatened and endangered species.



Table 3-13

## Threatened and Endangered Species in the Environmental Study Area

State	Common Name	Scientific Name	Federal Status
Michigan	Indiana Bat	<i>Myotis sodalis</i>	Endangered
	American Burying Beetle	<i>Nicrophorus americanus</i>	Endangered
	Hungerford's Crawling Water Beetle	<i>Brychius hungerford</i>	Endangered
	Karner Blue Butterfly	<i>Lycaeides melissa samuelis</i>	Endangered
	Mitchell's Satyr Butterfly	<i>Neonympha mitchellii mitchellii</i>	Endangered
	Clubshell	<i>Pleurobema clava</i>	Endangered
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
	Piping Plover	<i>Charadrius melodus</i>	Endangered
	Eastern Puma (=cougar)	<i>Puma (=Felis) concolor couguar</i>	Endangered
	Northern Riffleshell	<i>Epioblasma torulosa rangiana</i>	Endangered
	Copperbelly Water Snake	<i>Nerodia erythrogaster neglecta</i>	Threatened
	Kirtland's Warbler (=wood)	<i>Dendroica kirtlandii</i>	Endangered
	Gray Wolf	<i>Canis lupus</i>	Threatened
	American Hart's-tongue Fern	<i>Asplenium scolopendrium</i> var. <i>americanum</i>	Threatened
	Pitcher's Thistle	<i>Cirsium pitcheri</i>	Threatened
	Lakeside Daisy	<i>Hymenoxys herbacea</i>	Threatened
	Dwarf Lake Iris	<i>Iris lacustris</i>	Threatened
	Small Whorled Pogonia	<i>Isotria medeoloides</i>	Threatened
	Michigan Monkey-flower	<i>Mimulus glabratus</i> var. <i>michiganensis</i>	Endangered
	Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	Threatened
	Houghton's Goldenrod	<i>Solidago houghtonii</i>	Threatened
Ohio	Indiana Bat	<i>Myotis sodalis</i>	Endangered
	American Burying Beetle	<i>Nicrophorus americanus</i>	Endangered
	Karner Blue Butterfly	<i>Lycaeides melissa samuelis</i>	Endangered
	Catspaw (purple cat's paw pearlymussel)	<i>Epioblasma obliquata obliquata</i>	Endangered/ Experimental Population, Non-Essential
	White Catspaw (Pearlymussel)	<i>Epioblasma obliquata perobliqua</i>	Endangered
	Hine's Emerald Dragonfly	<i>Somatochlora hineana</i>	Endangered
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened
	Fanshell	<i>Cyprogenia stegaria</i>	Endangered
	Scioto Madtom	<i>Noturus trautmani</i>	Endangered
	Pink Mucket (Pearlymussel)	<i>Lampsilis abrupta</i>	Endangered
	Piping Plover	<i>Charadrius melodus</i>	Endangered/Threatened (inside/outside Great Lakes Watershed)
	Eastern Puma (=cougar)	<i>Puma (=Felis) concolor couguar</i>	Endangered
	Northern Riffleshell	<i>Epioblasma torulosa rangiana</i>	Endangered
	Copperbelly Water Snake	<i>Nerodia erythrogaster neglecta</i>	Threatened
	Lake Erie Water Snake	<i>Nerodia sipedon insularum</i>	Threatened
	Gray Wolf	<i>Canis lupus</i>	Threatened
	Northern Wild Monkshood	<i>Aconitum noveboracense</i>	Threatened
	Lakeside Daisy	<i>Hymenoxys herbacea</i>	Threatened
	Small Whorled Pogonia	<i>Isotria medeoloides</i>	Threatened
	Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	Threatened
	Virginia Spiraea	<i>Spiraea virginiana</i>	Threatened
	Running Buffalo Clover	<i>Trifolium stoloniferum</i>	Endangered

Source: US FWS Threatened and Endangered Species System (TESS), Listing as of 03/02/200. See [http://ecos.fws.gov/tess\\_public/TESSWebpageUsaLists?state=all](http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?state=all).



### 3.2.6.2 Migratory Bird Patterns

The Environmental Study Area comprises airspace at a juxtaposition of two major migratory bird flyways: the northwest branch of the Atlantic Flyway and the northeast branch of the Mississippi Flyway. Flyways are essentially broad geographic ribbons containing the individual migration lanes of millions of birds traveling from breeding grounds to winter quarters. This is, in general, a north-and-south movement with the lanes of heavier concentration following the coasts, mountain ranges and principal river valleys. Such a generalization is particularly valid for North America where such topographical features are in this alignment.

The diverse groupings of migratory birds frequenting these two important flyways utilizes an equally diverse range of habitat types, including habitat contained in four distinct physiographic regions occurring within the defined Environmental Study Area. Each region is described in detail below, and the size of each is given in hectares (ha).<sup>28</sup>

#### **Migratory Bird Habitat within Physiographic Areas**

##### ***Allegheny Plateau Area (12,261,100 ha)***

The Allegheny Plateau Area (see **Figure 3-15**) comprises much of west-central Pennsylvania; the southern tier of New York to the base of the Adirondack Mountains, and a portion of northeast Ohio that occurs within the proposed project area. The region possesses some of the most deeply forested areas in the northeast, although forested areas are declining in the rapidly urbanizing area. The remaining forests are predominantly upland oak-hickory forest types in the south and beech-maple forests in the north. At somewhat higher

elevations, fragments of spruce-fir, white pine and hemlock occur. The typically rounded hills and narrow to broad valleys are a result of both natural weathering by water and wind and the effects of glacial erosion and deposition. Valley bottoms commonly contain vast deposits of glacial till, sand and gravel. Among other unique features of this physiographic region are peat bogs and swamps. Important bird habitat types include grasslands, scrub-shrub (disturbed areas), deciduous and mixed forests and the mountaintop coniferous forests. **Table 3-14** lists the priority species for these habitat types.

##### ***Prairie Peninsula (20,536,571 ha)***

The Prairie Peninsula comprises an area from northeastern Missouri, across much of Illinois and through the middle of Indiana and continuing northeasterly into Ohio with fingers thrusting close to the Lake Erie area. It is a gently rolling glacial plain in the west, but becomes flatter to the east, where prairie and oak openings were historically embedded in the dominant beech-maple forest. In pre-settlement times, the landscape was a mixture of tall-grass prairie, savannah and forest, each an important habitat resource for a plethora of migratory birds. Prairies are extensive grasslands essentially devoid of trees and shrubs (i.e., less than 10% tree cover), while savannahs are unique, but highly variable grasslands interspersed with trees (i.e., canopy cover more than 10% but less than 50%) but almost devoid of a shrub layer. The important thing to note is that both habitat types were influenced and/or maintained by fire, either natural or set by man (this is believed to have been a practice of Native Americans). The scarcity of these habitat types in post-settlement times is a direct result of fire suppression activities. The loss of these habitat types, as well as the reduction and fragmentation of forest



Midwest Airspace Enhancement EA  
Figure 3-15: Migratory Bird Habitat with Physiographic Areas

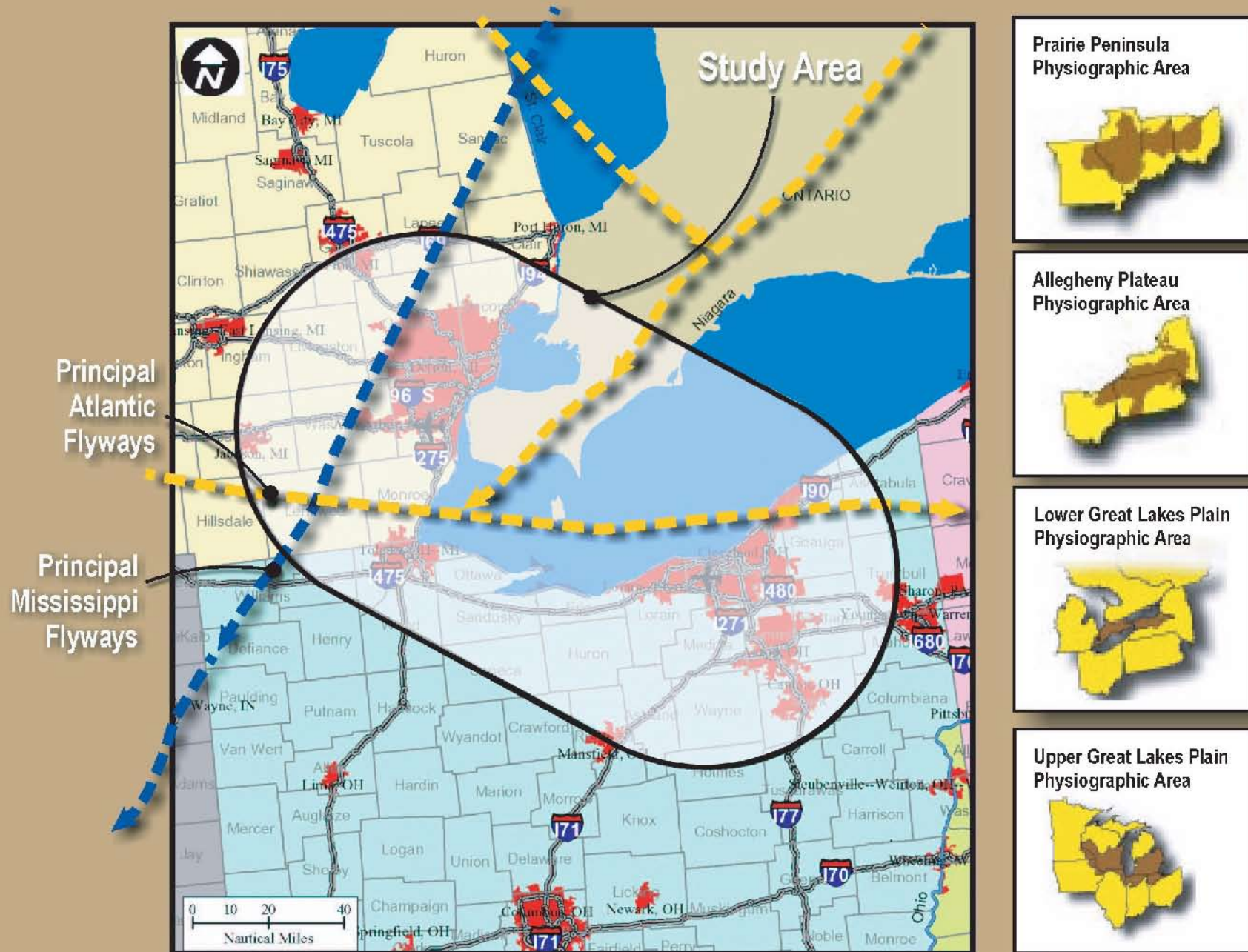




Table 3-14

## Priority Bird Populations and Habitats

Habitat Type	Priority Migratory Bird Populations	Applicable Physiographic Regions
Wetlands (marsh, scrub-shrub)	<ul style="list-style-type: none"> <li>black rail</li> <li>American black duck</li> <li>king rail</li> </ul>	<ul style="list-style-type: none"> <li>Prairie Peninsula</li> <li>Allegheny Plateau</li> </ul>
Bottomland Hardwoods	<ul style="list-style-type: none"> <li>cerulean warbler</li> <li>red-headed woodpecker</li> <li>American black duck</li> </ul>	<ul style="list-style-type: none"> <li>Lower Great Lakes Plain</li> <li>Upper Great Lakes Plain</li> </ul>
Mixed Deciduous	<ul style="list-style-type: none"> <li>worm-eating warbler</li> <li>Louisiana waterthrush</li> <li>wood thrush</li> <li>Canada warbler</li> <li>black-throated blue warbler</li> <li>cerulean warbler</li> <li>red-headed woodpecker</li> <li>scarlet tanager</li> <li>black-billed cuckoo</li> </ul>	<ul style="list-style-type: none"> <li>Allegheny Plateau</li> </ul>
Deciduous Forest - Savannah	<ul style="list-style-type: none"> <li>cerulean warbler</li> <li>red-headed woodpecker</li> <li>eastern wood-pewee</li> <li>black-billed cuckoo</li> </ul>	<ul style="list-style-type: none"> <li>Prairie Peninsula</li> <li>Upper Great Lakes Plain</li> </ul>
Scrub-shrub (disturbed and Barrens (incl. pine)	<ul style="list-style-type: none"> <li>golden-winged warbler</li> <li>American woodcock</li> <li>Bell's vireo</li> <li>blue-winged warbler</li> <li>field sparrow</li> <li>black-billed cuckoo</li> <li>willow flycatcher</li> <li>eastern towhee</li> <li>prairie warbler</li> </ul>	<ul style="list-style-type: none"> <li>Allegheny Plateau</li> <li>Prairie Peninsula</li> <li>Lower Great Lakes Plain</li> <li>Upper Great Lakes Plain</li> </ul>
Grasslands (incl. pasture)	<ul style="list-style-type: none"> <li>Henslow's sparrow</li> <li>upland sandpiper</li> <li>sedge wren</li> <li>greater prairie chicken</li> <li>dickcissel</li> <li>bobolink</li> <li>short-eared owl</li> <li>grasshopper sparrow</li> </ul>	<ul style="list-style-type: none"> <li>Allegheny Plateau</li> <li>Prairie Peninsula</li> <li>Lower Great Lakes Plain</li> <li>Upper Great Lakes Plain</li> </ul>

Source:  
Partners in Flight, Bird Conservation Plans for Northeast Region.



acreage due to widespread conversion to agriculture, resulted in the decline or displacement of many native migratory bird species. **Table 3-14** lists the priority species for these habitat types.

#### ***Lower Great Lakes Plain (4,770,500 ha)***

The Lower Great Lakes Plain covers the low-lying areas to the south of Lake Ontario in New York and to the north of Lake Erie in southernmost Ontario, Canada. Within the project area, this physiographic region encompasses the southwestern shoreline of Ontario on Lake Erie. A large percentage of this region's land area is urbanized and this percentage is on the increase. In addition to the habitat loss from urbanization, some three-quarters of the land areas have been converted to agriculture. However, the remaining natural area includes important wetland and bottomland hardwood habitat that provides important "traps" or stopover areas for migratory birds in transit. This habitat is a mixture of oak-hickory, northern hardwood and mixed-conifer forest. Many of the hardwood forest fragments are associated with wetland systems of the Lake Erie shoreline and creek bottoms, but urban pressures are continually influencing land-use decisions in this sub-region. **Table 3-14** lists the priority species for these habitat types.

#### ***Upper Great Lakes Plain (19,159,100 ha)***

The Upper Great Lakes Plain is a huge physiographic region that covers the southern half of Michigan and northwest Ohio, including all of the shoreline of Ohio lying within the proposed project area. It stretches westward to include northern Indiana, northern Illinois, southern Wisconsin and small portions of southwest Minnesota and northwest Iowa. The topography is characteristic of glacial moraines and dissected plateaus.

Historically, the natural vegetation types common to this topography were broadleaf forests, oak savannahs and a variety of prairie communities. There are many large urban centers in this area whose growth and sprawl will continue to consume land. Indeed, even before recent trends in urban sprawl, the vast majority of the pre-settlement forest and oak savannah grasslands had already been converted to agriculture. Although the conversion to crop or pastureland may have benefited some grassland bird species, a fragmented forest landscape provides a host of problems for sustaining vibrant bird populations. For instance, forest fragmentation, a situation created by indiscriminant clearing of forested areas resulting in a patchwork of much smaller "fragments", has been shown to lead to increasing rates of cowbird parasitism and nest predation on neotropical migrant birds. As a result, most of the remaining self-sustaining populations occur where the few large tracts of contiguous habitat still exist, whether it is forest, grassland or savannah. **Table 3-14** lists the priority species for these habitat types, species for which habitat loss and other factors have resulted in population declines within the region.

### **3.3 NON-AFFECTED RESOURCE CATEGORIES**

The Proposed Action, implementation of alternative air traffic procedures and airspace flight track routings, does not include construction of any physical infrastructure. Therefore, there are no anticipated impacts to the following environmental impact categories:

- Coastal resources,
- Construction impacts,
- Energy supply and natural resources,



- Farmlands,
- Floodplains,
- Hazardous materials and solid waste,
- Light emissions and visual impacts,
- Water quality,
- Wetlands, and
- Wild and scenic rivers.

No detailed description of the affected environment associated with these impact categories is provided in order to present only the information that is pertinent to the environmental analysis of the Proposed Action. However, a brief discussion for these categories will be included in Chapter Four, Environmental Consequences.



## Notes

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- <sup>1</sup> 65 FR 76339.
- <sup>2</sup> Located at 40-40-19N/080-40-21W: See [americasroof.com/highest/oh.shtml](http://americasroof.com/highest/oh.shtml).
- <sup>3</sup> See Section 1.2.3.
- <sup>4</sup> Cleveland Hopkins International Airport, [www.clevelandairport.com/](http://www.clevelandairport.com/), February 2005.
- <sup>5</sup> Detroit Metropolitan Wayne County Airport, [www.metroairport.com/](http://www.metroairport.com/), February 2005.
- <sup>6</sup> National Oceanic and Atmospheric Administration, [www.berner.com/new/energy-windspeed.htm](http://www.berner.com/new/energy-windspeed.htm)
- <sup>7</sup> Temperature, precipitation and snowfall averages from Midwest Regional Climate Center, [mcc.sws.uiuc.edu/html/](http://mcc.sws.uiuc.edu/html/), February 2, 2005.
- <sup>8</sup> Midwestern Regional Climate Center, [sisyphus.sws.uiuc.edu/index.html](http://sisyphus.sws.uiuc.edu/index.html).
- <sup>9</sup> National Weather Service, Detroit/Pontiac at [www.crh.noaa.gov/dtx/?page=climate/dtw\\_summary\\_2004](http://www.crh.noaa.gov/dtx/?page=climate/dtw_summary_2004), and Cleveland at [www.erh.noaa.gov/er/cle/climate/climate.html](http://www.erh.noaa.gov/er/cle/climate/climate.html).
- <sup>10</sup> *Indian Reservations in the Continental United States* map, compiled by the Bureau of Indian Affairs, located at [www.cr.nps.gov/nagpra/DOCUMENTS/RESERV.PDF](http://www.cr.nps.gov/nagpra/DOCUMENTS/RESERV.PDF), accessed February 21, 2005.
- <sup>11</sup> Department of Transportation Order 5610.2, “Environmental Justice in Minority and Low-Income Populations,” April 15, 1997, see Appendix, pg 18380.
- <sup>12</sup> Ibid.
- <sup>13</sup> Department of Transportation Act of 1966, section 4(f) [recodified at 49 USC 303 (c)].
- <sup>14</sup> FAA Order 1050.1E, Appendix A, pp. A-20.
- <sup>15</sup> Following the Office of Management and Budget’s Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect who is poor. If the total income for a family or unrelated individual falls below the relevant poverty threshold, then the family or unrelated individual is classified as being “below the poverty level.”
- <sup>18</sup> Ibid.
- <sup>19</sup> 16 USC 460.
- <sup>20</sup> U.S. Fish & Wildlife Service, *Necedah NWR Comprehensive Conservation Plan*, [www.fws.gov/midwest/planning/Necedah/final\\_ch1.pdf](http://www.fws.gov/midwest/planning/Necedah/final_ch1.pdf), pp. 6.
- <sup>21</sup> Regulations related to the Section 106 process are outlined in 36 CFR Part 800 “Protection of Historic Properties.”
- <sup>24</sup> 16 USC 470, promulgated under 36 CFR Part 800.10.
- <sup>25</sup> National Register of Historic Places, 36 CFR Part 60.
- <sup>27</sup> EPA Air Quality Planning & Standards, *Lead – How Lead Affects the Way We Live & Breathe*, November 2000, available at [www.epa.gov/air/urbanair/lead/index.html](http://www.epa.gov/air/urbanair/lead/index.html).
- <sup>28</sup> One hectare is equal to approximately 2.47 acres or the area of a square 100 meters on each side.